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EDITORIAL.

Cinchona.

The estimates of the late Sir Andrew Balfour that malaria causes the death of two million persons annually and that one-third of the human race suffers from this complaint are figures that have not been seriously refuted. The same authority states that an annual production of 26,000 tons of quinine would be necessary to treat all these patients.

Admittedly, as Dr. M. Kerbosch asserted in an address on Cinchona cultivation in Java, an abstract of which is included in this number, the above calculation has but a theoretical value. But it provides a basis for an endeavour towards the complete quininisation of malarial regions.

The above statements indicate the ideal situation, which admittedly is not yet within the region of practical politics, and the actual position, as the Java authority expresses it, is "the actual requirements demanded of an economical system of cultivation."

The present position is that 97 per cent. of the world's production of cinchona bark, from which quinine is extracted, is produced in Java. The total world production of bark is therefore about 12,000 tons per annum, which is approximately equal to 600 tons of quinine.

The Dutch contention is that the world is provided with all the quinine it is capable of purchasing at a price which allows a fair profit to the grower. This price is fixed by the Kinabureau, which is a Bureau constituted of 6 representatives of the cinchona planters and 6 representatives of the manufacturers. The Cinchona Agreement, the terms of which are decided by this Bureau and are revised from time to time, regulates the price of quinine to the world.

The author contends that this organisation has never exploited its monopolistic position and has, in fact, worked not only for the benefit of producers and manufacturers, but by reason of stabilising prices over a number of years, has prevented quinine becoming a speculative article in the hands of middlemen and has made it possible for governments to purchase quinine at a very low price for use in malarial areas. The Netherlands East Indies authorities resent, therefore, the suggestion frequently made, that the Dutch Cinchona Monopoly has used its powers to force up the price of a commodity of which practically the whole world requires supplies.

We think that Dr. Kerbosch has stated the case for the cinchona producers with great clarity and we gladly admit, not only that the Dutch are to be congratulated on the perseverance which has resulted in this outstanding success, but that the Cinchona Agreement has been of benefit by placing the cultivation of the crop on a sound basis and ensuring a steady supply of the product at a stable market price.

But in view of the international importance of this question of cinchona supply we have to ask ourselves whether the present position of control by the Kinabureau is adequate to meet the position at the present time.

If the Dutch view of the situation is correct that the present production supplies as much quinine as can meet the economic situation, and if the evidence placed before the League of Nations is also correct that 26,000 tons of quinine are required to supply the present malarial sufferers, it follows that the difference, namely, approximately 25,000 tons is required to supply those who cannot afford to purchase this medicine at a price which will allow an adequate profit to the growers. In terms of acreage this means that instead of the 55,000 acres which at present supplies the economic demand, approximately one million acres would be required to meet the " un-economic demand." We wish here to emphasise the fact that the difference between present production and possible consumption is so great that the whole question of supply and demand merits re-investigation.

There would appear to be one essential difference between the method of cultivation of cinchona in Java and that in India. In the former country the crop is grown over long periods on the same rich volcanic soils. In India the prunings and thinnings are used from about the fourth year, the crop being uprooted in about the tenth year. It is found that a second crop of cinchona cannot be grown on this land for a considerable number of years, in consequence of which it is necessary continually to be opening up new land. The Java system seems not only more economical, but more likely to make possible considerable extensions of the area for cultivation of the crop on a permanent basis.

It would seem that a careful survey is desirable of the areas suitable for the cultivation of cinchona. Such a survey cannot by its nature be the function of any one government, but might possibly be instituted by such a body as the League of Nations. With the information so obtained, the League would be in a position to recommend to various governments the quantity of cinchona required to be grown in order gradually to extend the treatment of malaria in areas that cannot be supplied on an economic basis. The governments concerned could thus arrange, either to subsidise the growers for the supply of this additional cinchona, or to establish government or international cinchona plantations for the purpose.

Opening of the School of Agriculture.

With the opening of the School of Agriculture, Malaya, an account of which is given in this issue, is inaugurated an institution which should fill a very definite position in Malayan agriculture. School gardening, which for some years has been included in the curriculum of Malay vernacular schools, is of value in teaching the rudiments of agricultural practice and inculcating a liking for rural pursuits, but it does not, and is not intended, to fit pupils to take their place in more ambitious agricultural spheres. Such an object can only be attained by the provision of a school of agriculture.

The new school provides two courses of instruction, viz : a one year course, mainly practical and a three years' course which is of a more technical nature and which should fit the successful students to fill various subordinate positions in the Departments of Agriculture and Co-operation, and the Rubber Research Institute of Malaya, and should enable them to accept more responsible posts on rubber estates and in the other practical agricultural activities of this country.

The fact that this School has commenced work during a period of widespread trade and agricultural depression may possibly be the cause of some misgiving amongst those who are unaware of the amount of thought and careful planning that has preceded the erection of the School. The advent of the slump, which particularly affects agriculture can, in our mind, only emphasise the necessity for agricultural education, to enable this country to be more adequately equipped to re-organise its agricultural activities in conformity with new economic factors. The country which successfully surmounts these difficulties is that which possesses the means of rapidly adapting its agricultural methods to a new set of conditions, which cannot be considered of a temporary nature, for as far as our major agricultural industries are concerned, it is unlikely that prices will revert to the old levels—at least for a considerable time.

We have mentioned that this project is the result of considerable thought and careful planning. The history of these deliberations goes back seventeen years. In 1914 a committee was appointed by Government consisting of four officials and three un-officials to consider the question of the establishment of a College of Tropical Agriculture. The findings of this committee are of interest. They were, *inter alia*, that the school should be one for the training of Asiatics. It was held that the institution should be in the nature of a school of agriculture, and under the control of the Director of Agriculture. The report of this meeting also states :—" It was further decided to invite attention to the urgency for the establishment of this school." On account of the Great War, the scheme was held in abeyance until 1920.

In the meantime, Dr. R. O. Winstedt, afterwards Director of Education, S.S. & F.M.S. visited Java in 1916 and provided Government with detailed information on the subject of agricultural education in that country.

Early in 1921, Mr. D. H. Grist, at that time Agricultural Instructor of this Department, reported on the system of agricultural education obtaining in Ceylon

and added proposals for agricultural education in Malaya. The Government supported these proposals, but the project was again held up on account of the "Slump" which followed in the next year or so. With the advent of more prosperous times in this country, the proposals were again taken up in 1926. Since then a Committee has worked on the details of the scheme, considered plans for the necessary buildings and more clearly defined the curriculum.

The opening of the school is therefore the fruit of the experience of many officials and un-officials in this country and in other countries. Much valuable experience has been gained at the small school of agriculture which was established at the Department of Agriculture in 1922 for the training of the Malay officers of the Department.

In spite of the present depression in industries, the School of Agriculture, Malaya is inaugurated under favourable conditions, and we expect it to have an ever extending beneficial influence on the progress of agriculture in Malaya.

The Malayan Exhibition.

The Malayan Agri-Horticultural Association, having emerged from a crisis in its history, has decided to hold its eighth annual Malayan Exhibition at Kuala Lumpur during the August Bank holidays. This is a decision that we welcome, for we believe that this annual event is capable of much useful work in encouraging native agriculture. In addition, it provides a unique opportunity for this Department, as well as for such bodies as the Rubber Research Institute and the Committee for Public Health Education, to demonstrate the application of new results of scientific research. These institutions have not been slow in the past in taking full advantage of the opportunities offered by the Malayan Exhibition, and it is noticeable that their demonstrations have annually increased in scope and improved in method of presentation.

It may be argued that it is unwise to hold the Exhibition during the present period of trade depression. On the other hand, the Exhibition may assist in stimulating trade and should encourage extended and better cultivation of foodstuffs by small-holders.

But the Exhibition has a still wider utility. It invites the reasoning public to review annually the position of Malaya as regards her foreign trade and the security of her internal economy. The fact is becoming increasingly evident that while the strength of the country lies in her normally valuable exports, the weakness of the position is the almost entire dependence on imports of staple foodstuffs. The dependence of Malaya on imports of rice, tea, meat and dairy produce is too well known to need reiteration in this place. It is the policy of the Department of Agriculture to demonstrate at the Exhibition means whereby Malaya may become more self-supporting in these respects and we venture to predict that our contribution to this subject at the forthcoming Malayan Exhibition will indicate new avenues for enterprise and progress towards the attainment of this object.

Original Articles.

CARDAMOMS*

BY

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This spice plant has been cultivated in India and Ceylon for many years, and considerable quantities exported annually especially to other Eastern countries. In view of the development of the Highlands of Malaya, which may prove a suitable situation for the cultivation of this crop, the following account is of interest.

Cardamoms are grown on the hills in both South India and Ceylon, although the chief centre of production is on the Cardamom Hills of South India, which thus gives their name to the crop. Cardamoms appear to thrive better in the former country than in Ceylon. On European-managed estates they are usually planted as a subsidiary crop to tea and coffee on comparatively small areas.

Cardamoms may be planted at elevations between 2,000 and 6,000 feet above sea-level but most of the cultivated areas lie between 2,000 and 4,000 feet. They require a fairly well distributed rainfall of between 125 and 150 inches per annum.

Situation.

One rubber cum tea estate in Ceylon has 47 acres of cardamoms, which are planted on the two sides and at the end of a deep valley, at an elevation of 3,800 feet. The average rainfall for the last 17 years has been 133 inches per annum and the average number of wet days 211.

Cardamoms are planted in sheltered situations in valleys where there is good soil. It is essential that the soil should be fairly moist and retentive of water, but on the other hand, drainage must be resorted to if the soil tends to become the least water-logged. As, however, the sides of the valleys are usually fairly steep, drainage is seldom necessary. In some places in Ceylon the soil is an exceptionally good chocolate-coloured loam, but in others it is less suitable as it contains a large quantity of gravelly quartzite similar to the South Indian soils. The type of soil is clearly reflected in the growth of the cardamoms.

In selecting a site for a plantation of cardamoms it is imperative that it should be one that is growing good jungle and at the same time be well sheltered from the wind.

Shade.

When felling the jungle, only the bushy undergrowth is removed and possibly a few of the smaller trees if they are very numerous, but nothing over 12 inches

*The following is part of the Author's report on an official tour of six months in Ceylon and India undertaken in 1930.

diameter should be cut. The shade left should be fairly dense, but at the same time the canopy of leaves should not be so thick that no light can penetrate. This shade not only improves the growth of the crop, but also checks the development of weeds. This could be clearly seen under fairly dense shade where there was scarcely a weed, while on somewhat poorer soil with thinner top shade there was almost a complete carpet of weeds.

Another result of shade is to prevent soil erosion, for where the shade is fairly dense there is an exceptionally fine layer of humus in the soil, despite the steep slope of the field. This is doubtless, in some measure, due to the fact that the large leaves of the cardamoms break the force of the rain and only allow it to fall to the ground as a spray or to run down the leaf stems into the stool of the plant. Further, is must be appreciated that the jungle trees left for shade must, to some extent, reduce the beating force of the rain.

Planting.

The usual method of planting cardamoms is to hole the area as soon as possible after the undergrowth has been cleared. The planting distance is usually 8 feet by 8 feet or possibly less, down to 6 feet by 6 feet. The holes are dug 2 feet by 2 feet and about 15 inches deep. A few pounds weight of cattle manure are placed into each hole and the latter is then filled with good surface soil, the soil and the manure being thoroughly mixed. The most common method of propagation is to take up the whole stool of a mature plant and carefully divide it, at least two tubers being planted in each hole.

It is also possible to propagate cardamoms by means of seed, but no information was obtainable on this point.

The Mysore variety is characterised by the long fruits with leaves that are silky on the underside. It is probable that this is the chief variety cultivated, but there is considerable confusion regarding the varieties, and there are a number of apparent hybrids.

In South India it is usual to replant an area after about twenty years, fresh holes being dug in the centre of each square and planted with tubers obtained by dividing the best stools of the growing crop. In Ceylon the plants are cropped for as long as forty years without replanting. This possibly accounts for the much smaller crops obtained there than in South India.

If the shade is satisfactory it is only necessary to weed the crop once a year. In addition, the coolies pull out any big weeds when harvesting. Weeding is usually done during the months of July and August when there is only a small crop maturing, but this is liable to alteration where the labour is required for another crop growing on the estate. The weeding, as with tea, is done with a small scraper of hoop-iron or a small chisel; "changkols" are strictly forbidden as it is considered that they disturb too much soil, resulting in an undue amount of erosion. A second weeding and general clearing up may take place during February—March if labour is available.

Pruning.

Pruning is usually carried out while the July weeding is in progress. It consists of cutting back all stems that have commenced to die, to about 2 feet above the ground. Care must be taken that the stems are not cut back too far as the natural die-back of the stems is very liable to spread down into the tubers at the base; should this happen, it will sometimes spread through the tubers and eventually kill the whole stool. The stems removed are those which are turning yellow and brown and which have had racemes growing at their bases. The dead racemes are also cut right back and removed from the stool. Any dead leaves, either from the cardamoms or from the shade trees, are removed from the hollow inside the stool and earth is scraped up round the base of the stems and over the tubers.

The best sign of a flourishing crop is a good number of new shoots, as each of these shoots produces a flowering raceme from its base. The stools of the mature plants reach as much as 5 feet in diameter in good soil, but are only about three feet across in the more exposed places with quartzite soil. Various attempts have been made to stimulate the crop by the application of manures, but it has not been found satisfactory and no marked increase of crop has ever been obtained by manuring. The reason given for this failure to respond to manure is the fact that cardamoms are naturally very deep-rooted and have very few, if any, roots near the surface of the soil; neither do the roots tend to spread out much from the sides of the plant.

Harvesting.

The flower on the receme remains open for about a week, a further three months elapsing before the fruits are ripe. In South India the fruit ripens during the period September to December and occasionally the harvest will extend into January, but in Ceylon the main crop is harvested from September to December, while there is in some years a secondary harvest during March and April, and invariably a certain amount of fruit ripening throughout the year.

When the main crop is ripening, it is necessary to send the harvesting gang round once every three weeks, but in the off season the interval may be increased to as much as six weeks. The incidence of the crop depends very largely on the rainfall; frequent heavy showers encourage the flowers to open, but if the rain continues after the flowers are open it reduces the number of flowers which set fruit.

One of the chief difficulties with cardamom cultivation is to maintain a sufficient force of efficient pickers, as it is very difficult to train the average Tamil woman for the work. The need for care arises from the fact that on the same raceme there may be fruits in all stages of ripeness, together with flowers. It is not desirable to allow the fruits to remain on the racemes till they are a deep yellow colour as much of the crop will be lost by falling naturally. The

fruits require to be collected as soon as the seeds become black, by which time part of the glutinous matter in the fruit will have dried up. Any fruit in which the seeds have not turned black is considered unripe. At this stage there is no very marked difference in the colour of the fruits, but a well-trained woman can tell whether it is ripe by the amount of pressure that has to be exerted on the fruit to make it fall from the raceme. It is customary to allow the women to harvest between 10 and 20 per cent. of unripe fruits without penalty.

The plants bear a small crop during the third year, which gradually increases to the eighth or ninth year and then remains about constant till the fifteenth year when it begins to decrease. In India and on some estates in Ceylon, re-planting is carried out about the twentieth year.

The average annual crop from mature plants in India is 1 cwt. per acre, the variation being between 80 and 120 lbs. From plants in Ceylon, reported to be forty years old, the average crop is 70 lbs. per acre, varying between 40 and 90 lbs. It is said that in some of the old estates the yields have fallen to as low as 20 lbs. per acre. A woman will harvest about a quarter of an acre a day and is paid at the rate of approximately 3 cents (Straits) per pound of fresh fruit.

Diseases and Pests.

The crop is practically free from either diseases or pests. Two minor pests have been recorded, but neither have ever reached sufficient proportions to call for detailed investigations into methods of control.

A borer *Dichorocis punctiferallis* Gn., is found in both South India and Ceylon. It attacks the tubers of the plant just below the collar and causes the stem to become slightly yellow. The amount of damage done is usually insignificant. Another borer, *Lampides elpis* Godt, very occasionally attacks the fruits.

It is, however, necessary to keep a watchman constantly employed in a cardamom field in order to shoot and drive away monkeys, pigs and porcupines. Further, if there is a village in the vicinity, or if there is easy access from a road, steps have to be taken to check theft which is particularly troublesome, as the thief invariably strips the racemes of all the fruit, both ripe and unripe, and so reduces the crop over a long period.

Preparation for Market.

There are two methods of preparing the fruits for the market, namely, "Sulphur-Bleaching" and "Green-Drying." The latter is by far the simpler method and is generally practised, particularly in India, but at times the premium paid on the sulphur-bleached product is high enough to encourage the former and more complicated method of preparation.

Sulphur-Bleaching. As soon as the fruits are brought in from the field they are carefully washed in water to remove all dirt, leaves, stones, etc. For

washing, it is necessary to have a smooth-sided wooden or cement concrete tank, conveniently situated near the bleaching and drying sheds. As soon as the fruits have been washed and while they are still wet, they are spread in thin layers on the shelves of the sulphur box.

The sulphur box is constructed of mud and wattle spread over a wooden frame of sufficient size to treat the crop expected. In the box are wire-netting shelves about 5 inches apart, the mesh being just small enough to hold the fruits, and the door being so constructed that it can be hermetically sealed with mud. Approximately three cubic feet of space in the box are required for each five acres under the crop. As soon as the fruits have been spread, rock sulphur is ignited at the bottom of the box at the rate of half a pound for every 100 lbs. of fruit and the box is then sealed for 12 hours. Normally, the fruits when they are brought in from the field in the afternoon, are washed and left to bleach in the sulphur box overnight. The following morning they are spread in the open in single layers, regardless of weather, and frequently turned, otherwise the fruits will not bleach to an even colour. This airing is continued for a whole day. If the weather is wet, after one day in the open they may be spread in a drying room. The drying room is constructed of mud and wattle with a close-fitting door to render it as heat proof as possible.

Hot air is passed through the room, by means of an iron pipe about 9 inches in diameter extended along the floor on three sides of the room about a foot from the wall and supplied with hot air from a small wood-burning furnace.

If it is necessary to use the drying room, the fruits may be thoroughly dried in 1½ days, but as with sun-drying, they must be thoroughly dried. The fruits are kept till there is a period of settled fine weather. At some convenient time during storage, any remaining portions of the peduncle, which originally connected the fruit to the raceme, should be cut off close to the fruit with a pair of scissors. These portions of stem must be cut off as closely as possible, but care must be taken that the fruit itself is not damaged, otherwise it will be unsuitable for the No. 1 grade. In this connection, it is essential while harvesting to avoid including an unduly large number of stalks in the crop; a good harvester will pick the fruit without any of the peduncle.

With the advent of settled weather, the fruits are soaked in water for 12 hours in the washing tub. For this part of the process it is essential that the sides of the tank be smooth, as the fruits are liable to injury and if damaged must be relegated to an inferior grade. At the conclusion of the 12 hours soaking, the fruits are replaced in the sulphur box for a second over-night bleaching for 12 hours. The fruits are then re-dried for at least one day in the open, being turned frequently, and then for a further period of one or two days with occasional turning till thoroughly dry; on the latter days the drying room may be used if the weather changes, but this is not desirable.

This process of soaking, bleaching and drying is repeated a third time. Sometimes, if the fruit is thin or of a poor colour, it may be necessary to give a

fourth bleaching, but this is not usual. The yield is about 25 per cent. of bleached to fresh green fruit.

Green-Drying. This method is very simple when compared with the system of bleaching with sulphur. The fruit is washed till it is thoroughly clean and then laid out in single layers, on "tats" in the dark till it is absolutely dry. With the method of green-drying, the yield of saleable fruits will probably be about 30 per cent. of the fresh fruit.

Grading and Packing.

The first grading is made by eye, according to colour, any of the product showing signs of discolouration being put aside as "Brown." The balance is then further divided into whole and split fruits, the former being the perfect fruits while the latter are those which have been damaged, either when the the stumps of the peduncles are being trimmed or on other occasions during the preparation of the fruits. Each of the three grades is then further divided by being passed over a sieve to pick out the Nos. 1 and 2, which are the larger grades. The only other grade is "Seeds;" this consists of the seeds taken from those fruits which have become badly split or broken in the course of preparation. Although the seed is the commercial product it does not command a sufficiently high price on the market to justify the cleaning of all the fruits. Bleached cardamoms lose up to 4 per cent. of their weight in transit to London.

The fruits are packed in tea chests (100 lbs. size) or boxes, but a special waterproof paper is used in place of lead for lining the cases. The product is sold either in Colombo or London.

Exports from Ceylon.

(These are not annual crops as stocks are carried.)

Year.	Total Lbs.	U. K. Lbs.	Europe (balance) Lbs.	U. S. A. Lbs.	India Lbs.	Other Countries Lbs.
1927	339,148	121,805	140,000*	19,031	3,000*	55,312
1928	365,148	109,027	140,000*	62,837	14,000*	39,284
1929	303,982	77,698	133,000*	32,370	5,000*	55,914

* Approximate.

Approximate Prices in Colombo.

(Rupees and cents per lb.)

Year.	Bleached.			Green			Seed		
	High	Low	Average	High	Low	Average	High	Low	Average
1928	3.80	2.00	2.50	2.80	1.75	2.30	3.50	2.00	3.00
1929	2.75	1.85	2.30	2.20	1.50	1.90	Not recorded		

COCONUTS ON HEAVY SOILS *

BY

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Plant Physiologist.

This short paper is a confession of ignorance, and is written in the hope that by pointing out some of the more important points on which information is urgently needed Field Officers may be moved to give their own experiences and views.

In most of the other countries where coconuts are grown on a large scale, e.g. South India, Ceylon or the Philippines, the average soil is, judging from literature, lighter than ours. With a few unimportant exceptions the commercial growing of coconuts in Malaya is limited to 'heavy' soils. It is true that considerable areas have been laid down on deep peat, but judging from a recent article by the Assistant Chemist for Copra Research [1], prospects on such areas are not brilliant.

The soils proper may be divided into 'peaty'—loss on ignition exceeding 80 per cent., 'organic'—loss between 20 and 80 per cent. and clays (or silts), the terms referring to surface layers varying in depth from a few inches to 4 feet; nearly all have the same sub-soil type beneath viz., a blue grey very sticky clay. Soils and subsoils are in general richer in plant food than the usual inland soil.

Sampson in his book 'The Coconut' is quite definite about the unsuitability of heavy soils as the following extracts show—

"The essentials for natural drainage, therefore, are a free working soil of open texture, and either a deep water table or else free water movement through the soil. Too often, in newly opened-up countries, has the coconut had to take a back seat and give preference to rubber, which has been given the pick of the best-drained land, while any low-lying land which is not considered good enough for rubber has been relegated to the coconut. The result is that in those countries the possibilities of the coconut as a revenue producing crop have very rarely been realised.

"The natural drainage of the soil is, therefore, the first desideratum in choosing a site for a plantation. An examiniation of the natural vegetation on the land will often afford a useful guide to this. In open country, the presence of rushes, sedges and other water-loving plants will indicate poor natural drainage. Where there is forest growth the same method holds good, but it must not be forgotten that a dense forest growth makes great demands on the water in the soil, and that, though the land may appear to be fairly dry when

* Paper read at the Second Inter-Departmental Agricultural Conference, Kuala Lumpur, F.M.S. October, 1930.

1 "Coconuts on Peat." F. C. Cooke, *Malayan Agricultural Journal*, Vol. XVIII, 12, 1930.

covered with forest growth, when the trees have been removed the drainage may be far from what is desired. The writer remembers seeing a native clearing on low-lying land near the coast where most of the forest trees had been removed. Those trees which had been left were all dying for no other apparent reason than that they were unable to withstand the excess of water in the soil after the main part of the forest had been cleared.

"In forest land where drainage is deficient one must also look out for the excessive formation of humus or organic matter. On such land this will often accumulate and cause the formation of what resembles peat. Usually where this occurs there will be found underneath an impermeable layer of stiff clay. An examination of any water courses in the neighbourhood will often form a guide to the nature of the sub-soil.

"A free working soil of considerable depth and with good drainage, even though of poor average fertility, is much more desirable than a rich soil which has not got free drainage, either being too heavy or with too high a water table. It may take longer to bring the trees to bearing, but the future prosperity of the plantation is assured when once it does commence to bear. The root system of the coconut has a very wide feeding range, and with good drainage will go to considerable depths. With trees planted 30 feet apart, there are fifty six to the acre. Thus each tree has on an average 777 cubic feet of soil for the roots to range in for each foot depth of soil. Thus where the roots can go down to say 8 feet, the tree has four times the quantity of soil which one has which can send its roots down only 2 feet."

It is interesting to note that Sampson[2] gives an instance in British Guiana of mature palms growing on heavy pagasse soils (apparently closely akin in character and mode of formation to our 'organic' soils) giving very heavy yields. He considers however that they cannot possibly have a long life.

In spite of this opinion we have a considerable number of estates over 16 years old which are still quite definitely commercial propositions averaging 11 piculs of copra and in some cases rising to 14—16 piculs.

It is suggested that Sampson has omitted from consideration the possibility of artificial drainage and that in this lies the key to the inapplicability of his remarks taken without qualification to Malaya.

Coconuts do not grow equally well on all of our types of soil; in addition to the areas of peat visited by Mr. Cooke there is another large area of dwarfs on deep peat which also shows little promise.

Coconuts growing on peaty or organic soils vary considerably in yield and appearance, depending to some extent on the surface soil. If this after drainage is one foot or less, excellent and continued growth is possible. From 1 foot to 3 feet (roughly) the plants seem in their early stages to grow remarkably but later they frequently lose ground and later still may become almost or entirely unremunerative. I have had no experience with deeper organic soils. Heavy soils with not more than 1—2 inches of 'humus' seem to support growth quite

2 Empire Marketing Board 4, 1927.

well except in the case of the extremely stiff soils found in patches in the neighbourhood of the Bernam river on which growth may be retarded.

It will be seen therefore that even with careful and extensive drainage Sampson's remarks, although far too sweeping, have some foundation.

We have now to enquire whether any explanation can be found for poor growth where it occurs. It must be stated at once that as is the case with nearly all coconut problems, no explanation is yet forthcoming. Since poor growth is frequently associated with peat or peat-like bodies the first object of research should clearly be acidity. Acidity, measured in suspension, of practically all peat, peaty or organic soils in this country is very high (pH2.8-4.4), clear extracts may however vary from pH 3.0 to the usual 6.4. Good mature coconuts are found on very acid (suspension) soils but there seems to be a rather direct connection between poor yield and growth and high acidity in clear extracts. As so often happens, it is impossible to state whether the effect is direct or whether both soluble acidity and poor yield are effects of poor drainage, aeration, etc. It is significant in this connection that in some cases where acidity is high the young coconuts make quite good growth and yet it is precisely in the early stages that acidity might be expected to show a maximum effect. In any event poor growth has been met with where drainage was excellent and soluble acidity practically absent.

Another line of attack is that of water supply, it may be that organic soils readily tend to dry down to near wilting point and here Britten Jones'[3] work on Bronze Wilt is of interest. In Trinidad coconuts planted on the old stiff sugar lands suffer considerably from 'wilt' and this is considered by Britten Jones to be due to excessively close drainage. It is also claimed that the wilt can be produced by severing the roots. A further fact in support of this theory is that on an area of particularly poor and dying coconuts in Selangor the trouble has been correlated with the fact that the organic soil (about 2 feet deep) overlies a sandy sub-soil, probably an old river bed. On the other hand, it is difficult to believe that our climate is likely to give rise to drought damage in normal years.

Walker in *Phil. Jour. Sc.* 1, page 60, 1906 points out the superior growth of trees near the sea-shore growing on very permeable soils, over those further inland on stiff clays and attributes this to the fact that the soils near the sea-shore are permeated by moving water while those inland, owing to their high water capacity, may be physiologically dry. He suggests the necessity of artificial irrigation for such heavy soils.

It is possible that soil atmosphere (which will shortly be investigated) may supply an explanation. Is it that oxidation of organic matter gives rise to an excess of carbon dioxide and deficiency of oxygen which adversely affects the roots as they tend to go deeper? It is impossible to decide between these alternatives without much further work and observation.

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3 Tropical Agriculture, 1928.

Another evil effect of poor aeration is the high probability that large quantities of toxic soluble ferrous (iron) compounds may be produced.

Where clays or silt come near the surface good growth can be maintained—the chief trouble met with is excessive leaning and eventual loss of trees in somewhat alarming numbers where the water table is high—due without doubt to the comparative shallowness of the root system and to the buttery consistency of the soil. Two remedies have been proposed (a) planting in deep holes, unless special precautions are taken this is likely to lead to trouble with water-logging, (b) deepening the drainage system and spreading the resultant spoil to give more root-hold.

As the trees seldom lean in any one direction it appears not impossible that some system of stays from tree to tree could be devised.

To sum up, organic and peat soils of more than 1 foot depth may lead to trouble in later stages of growth; with less than that depth excellent and long continued growth can be obtained under Malayan conditions, where some form of drainage is always provided.

The reason why certain soils in the neighbourhood of the Bernam should be excessively stiff has not yet been answered, pH, bases, mechanical composition and silica sesquioxide ratio are very similar to other less troublesome soils. The matter is being investigated in the Soil Laboratory and speculation at the present time would be unprofitable.

Drainage.

Here we touch the most controversial of topics. There are only two agreed points—

(a) that some form of drainage is necessary,

(b) that surface standing water is exceedingly deleterious, the leaves turning yellow and exhibiting the characteristic signs of nitrogen starvation.

When we come to the question of depth and interval of drains coconut planters seldom agree even when they are on adjacent or even on the same estates.

It need hardly be pointed out to an audience of experts that drainage is supposed to benefit the plant at least as much by the entrance of fresh air as by the removal of free water. At first sight it seems strange that there can be any drainage at all in our apparently extremely stiff soils or sub-soils but the fact remains that the free water-table *is* lowered by drains 1—2 chains apart and no one who has seen water pouring into recently deepened drains can ever doubt that movement does take place; further, borings show quite clearly that the water table at any time is nearly uniform. Yet such soils or sub-soils may show practically no coarse fractions at all; with a similar mechanical analysis in temperate climates they would require sub-soil drains every few feet. The greatest difference lies in the chemical composition of the 'clay'

which with us is lateritic in nature and therefore not nearly so 'sticky' as is 'clay' in a temperate climate. I have made observations on the percolation of water through some of our heavy clays and find that a layer of soil 4 inches deep can under a head of 8 inches pass approximately 1 mm. of water per day. This would be sufficient to ensure adequate lowering of a water table. Owing to the very high water capacity of these heavy soils and sub-soils, amounting to 90 per cent. on dry weight, it is not certain that air movement is greatly facilitated and this is probably responsible for the fact that the bulk of roots are found at depths of less than 15 inches.

Water Movement.

All writers on the subject emphasise the fact that a high water table is not necessarily injurious provided there is free *movement* of water and Howlett has recorded some interesting observations on this point on light soils on the East Coast. One very successful estate in the North makes use of sub-soil irrigation by keeping a ditch at the higher end of the field full of water, with a deep drain at the other. On the majority of estates however such movement is not easy to obtain and it might be worth investigation whether, say, weekly alterations of level by means of water-gates would be beneficial.

Observations by Agricultural Field Officers are particularly called for in connection with drainage as experimental interference with levels is difficult and owing to the unknown length of time required for root systems to accommodate themselves, results may be misleading.

The question of salt is connected with drainage. While the presence of salt does *not* explain the majority of cases of poor growth (it is always sought), Cooke has recorded observations which indicate that brackish water near the sea does not support good growth.

Cultivation and Cover Crops.

Here again we are confronted with conflicting opinions, ranging from the clean weeding enthusiast to the let-the-grass-grow-and-slash-it-sometimes planter. Deep cultivation is little practised and on most shallow-rooted areas would undoubtedly result in an initial decrease of yield. Only experiment can decide between the different systems on any given type of soil.

Manuring.

There is little manuring in Malaya in striking contrast to Ceylon where manures are normally employed. Our heavy soils should, in theory, contain sufficient plant food and the possibility of dispensing with manures should compensate for extra expenditure on drainage—but there is always the possibility that a small amount of stimulant may be beneficial.

There remains the question of the return of nutrients in leaves and husks to the soil. I am convinced that where débris is left to rot on a clean weeded surface of heavy soil very large losses of nutrient occur in run-off water.

Where the husks are burnt and the ashes returned nitrogen is of course lost.

Analyses from different sources of the nutrients contained in crop products differ materially and the following figures are given merely as indications—they are from the Philippines, converted into lbs. per acre with a crop of 2800 nuts.—

	Nitrogen (N)	Potash (K_2O)	Phosphorus (P_2O_5)
Husk and Shell ...	14	32	4
Meat	31	16	11
Milk	10	8	1
	55	56	16
Leaves (dead) ...	27	68	21

It is clear that, even if these quantities are halved, there is considerable reason for work on conservation of residues and dead leaves. Officers' experience with estate practice will be welcomed.

Experiments in hand.

These may be summarised as follows—

Complete manure, with and without lime, is being tested on areas which are clean weeded and grass covered, and lightly and deeply cultivated—with the appropriate controls. The experiments are being laid down on different soil types and records will be made for a considerable period, this is particularly necessary owing to the length of maturation period of coconuts. Results of one large scale manurial experiment carried out over 5 years to which I have had access were completely negative and I am not optimistic of a more positive result with the new series—but a known and reliable negative result will be of utmost value.

There remains the question of liming. As stated above, many of the organic soils are highly acid; I hesitate, however, to suggest liming as a remedy, without further experiment. Firstly it is costly, secondly applications of even 1 ton per acre will not materially alter the pH and lastly acidity, as suggested above, may be more of an effect than a cause.

RICE MILLS IN MALAYA

BY

H. W. JACK,

Economic Botanist.

All the rice mills in this country are situated in or near the large rice producing districts of Kedah, Province Wellesley, Penang, and North Perak, and with the exception of two large Government mills, they are all in the hands of the Chinese.

In Kedah, there are 21 mills, but only 18 have been worked regularly. Of these there are 3 large mills and 15 of medium size the latter having capacities varying from 1,000 to 4,000 gantangs of padi per diem. The annual output varies considerably, but probably averages not less than 20 million gantangs of padi annually. The bulk of the output is polished white rice, though a little "parboiled" is also produced.

In Province Wellesley, there are 8 mills, of which only 6 are operating. One of these is a small mill, 4 are mills of medium capacity (3,000—4,500 gantangs padi per diem), and one is a large mill of some 22,000 gantangs of padi daily capacity.

The smaller mills usually obtain their entire padi supplies from local cultivators, but the larger mills not only purchase local padi but import supplies from Kedah, Perak, and Teluk Anson (grown in Kuala Selangor) and in some years even import padi from Burma and Siam. The total annual out-turn of the mills in Province Wellesley is about 6,500,000 gantangs of padi, of which approximately 80 per cent. is converted into parboiled rice for consumption by Indian labourers on estates.

There are 11 mills in Penang—6 situated in the south-west district and 5 in Georgetown. Of the former only 4 small mills driven by water power ("lesong ayer") are operating and mill in all some 48,000 gantangs of padi per annum in a good year, the padi being purchased from local cultivators and converted into white unpolished rice for resale to the growers and other Malays. Of the latter, only three are operating—one of medium capacity and two large mills. Each of these three mills is supplied with padi shipped from Kedah, Province Wellesley and Krian, and the out-turn amounts to some 900,000 gantangs of padi per annum. Approximately, 75 per cent. of the padi milled is converted into parboiled rice, the remainder being sold as polished rice.

In North Perak, there are 3 large rice mills, all situated in the Krian District. Two of these mills are owned by the Government—one being located at Bagan Serai and having a capacity of some 200 bags of rice per diem;* the other at Kuala Kurau is about four times as large but has not been worked since 1927 owing to lack of sufficient supplies of padi.

*A bag of rice weighs approximately 227 lbs. (or 170 kati).

The third mill is Chinese owned, situated in Parit Buntar and has a capacity of 200 bags per diem of twelve hours. The Bagan Serai and Parit Buntar mills each produce 50,000—60,000 bags of rice per annum, of which probably 90 per cent. is parboiled. They depend for their supplies almost entirely on Krian grown padi though some padi is usually purchased in Kedah. It may be mentioned that the establishment of Government mills in the Krian District aimed at stabilising padi prices and the encouragement of padi planting by ensuring fair prices for padi locally grown.

In addition to the large mills in Krian, there are a few small power mills on adjacent estates for which Krian padi is purchased at prevailing rates, and these mills handle annually some 400,000 gantangs of padi.

In milling padi by the parboiling process, the products are generally estimated by weight as follows :—Rice 62 per cent., Broken rice 2.2 per cent., Bran 9.2 per cent., Husk 26.4 per cent.

When white rice (polished) is produced if the padi season has been a good one, the milling products show approximately the following proportions :—White rice 62 per cent., Broken rice 2.5 per cent., Bran 5.9 per cent., Cargo bran 6.5 per cent., Husk 23.1 per cent.

With the exception of the husk, which affords an efficient fuel for working the mills, all the above products command profitable prices.

Broken rice (white and parboiled) is used occasionally for human food, but generally for feeding pigs and fowls.

Polishings and bran are sold in two grades, and the following figures are the average prices during the last five years at Bagan Serai Mill :—

White Broken Rice	...	averaged	$7.85	per	bag	of	170 kati.
Parboiled Broken Rice	...	,,	$6.68	,,	,,	,,	170 ,,
White Polishings	...	,,	$3.30	,,	,,	,,	100 ,,
Parboiled Polishings	...	,,	$2.81	,,	,,	,,	100 ,,
White Cargo Bran	...	,,	$1.41	,,	,,	,,	75 ,,
Parboiled Cargo Bran	...	,,	$1.28	,,	,,	,,	75 ,,

Prices for by-products vary somewhat in the different mills, depending on supplies and demand.

None of the mills in Malaya are worked at full capacity, since padi supplies are usually much below requirements, though, in good padi seasons, some of the mills can obtain sufficient supplies to keep them going for 8—9 months. Also, padi and rice prices in Malaya are controlled by factors outside the country, and sometimes in consequence local padi milling is not profitable.

This summary of information on local mills is based on reports written by Field Officers in Perak North and in Province Wellesley and by the Principal Agricultural Officer, Kedah, whose assistance is acknowledged.

THE PREPARATION OF COIR FIBRE

BY

B. Bunting,

Agriculturist.

Native Manufacture.

Opportunity was taken, during a visit to Ceylon in February, 1930, to investigate the coir fibre industry which has long been established in that Colony.

A visit was paid to a small coconut fibre mill, run by a Sinhalese, near Chilaw.

The extractors were locally-made and housed under an open shed made of kajangs.

The coconut husks usually cost about Rs. 3 per thousand delivered at the mill, but when the price of fibre is high as much as Rs. 4 per thousand is paid. The husks are retted in water for a period of 3 to 4 weeks, a large open pit being employed for this purpose.

After the retting is complete the wet husks are passed through the extractors which are in pairs, one machine, with rough spikes, being called the "breaker" and the other, with fine spikes, called the "finisher."

The "breaker" is composed of large wooden drums fitted with coarse iron spikes and the cooly merely presses one half of the husk against the drum, which is revolving at a high speed, and withdraws the main portion of the fibre from the husk. The latter is then reversed and the other half treated in the same way.

The "finisher" is placed alongside the "breaker" so that the partially cleaned fibre can be handed over to the cooly in charge of the finisher. This machine is very similar to the "breaker", except that the drum is set with finer teeth, and removes the balance of fibre from the outer portion of the husk.

The fibrous portion not passing through the machines, but left in the operator's hands, is known as "bristle" fibre. This is removed to an open shed containing a large concrete tank filled with water, where the fibre is washed by hand and sun-dried.

The balance of the fibre passing through the machines, known as "mattress" fibre, is then sun-dried and afterwards passed through a winnowing machine. This machine consists of a revolving screen, open at both ends and placed at a slight inclination to the horizontal.

This work is carried out on contract and the two men in charge of a pair of machines are paid 50 cents per cwt. of wet bristle fibre produced. This usually given about one-third of its weight of dry fibre.

The following is a list of the machines employed in the mill in question—

5 pairs Extractors (i.e., 5 breakers and 5 finishers).

1 Revolving Screen for cleaning mattress fibre.

1 x 24 H.P. Crossley Cold-starting Engine, using liquid fuel.

1 Hand baling Press for mattress fibre.

The bristle fibre was made by hand into bundles of 28 lbs. each and secured with rope, but the mattress fibre was placed in a baling press and made into bales of about 12 lbs. each. The contract for baling was Rs. 24 per thousand bales.

All the fibre is sold in Colombo and the prices realised are (1) Bristle fibre Rs. 9.50 per cwt. and (2) Mattress fibre Rs. 1.40 per cwt. f.o.r. Colombo. The prices are subject to slight variation and the quotation (Colombo 15th February, 1930) were Bristle fibre Rs. 9.35 and Mattress fibre Rs. 1.15.

European Manufacture.

The possibilities of producing coir fibre were discussed with an important Colombo exporter of coir who stated that Ceylon could not compete with Southern India in either the quality or quantity of the coir fibre produced in that country, where it was obviously being run as a cottage industry with little or no capital outlay. The firm had formerly three coir factories working under European supervision, but the returns were so low that two of the factories had been closed down and the only one now left was in the district of Kurunegala. This factory was equipped with locally-made machinery and was capable of dealing with 100,000 husks per week, or 30,000,000 husks a year. It is stated that a minimum of 15,000,000 husks a year is required to run a factory on an economical basis.

In the manufacture of matting it is necessary to use the whole of the fibre from the husk and not separate it into bristle and mattress fibre. Further, in order to obtain a light coloured fibre it is essential that the nuts should be husked while they are still green, which would naturally affect the quality of the copra.

A factory at Kurunegala is equipped with 16 pairs of machines and fitted with concrete retting tanks in which the water can be changed daily so that the quality of the fibre is not affected by stagnant water. The duration of retting in such tanks is reduced to 10 days, whereas the retting in native mills is carried out in dirty stagnant water for a period of 3 to 4 weeks, with the result that the fibre is dark and of comparatively poor quality. Salt-water is quite impossible for retting and as stagnant water discolours the fibre the only alternative is to employ fresh water for this purpose.

It is stated that 20 machines on a 16 hour day will produce 300 tons of bristle fibre and 600 tons of mattress fibre a year from 7,250,000 husks. Further, it is estimated that 24,000 husks will produce 1 ton of bristle fibre and 2 tons of mattress fibre.

The fibre is baled in an hydraulic press in 2½ to 3 cwt. bales, which roughly measure 11 cubic feet per bale.

The price paid for the husks depends entirely on the market price of the fibre and varies from Rs. 1 to Rs. 3 per thousand delivered at the factory.

YIELDS OF TODDY FROM COCONUT PALMS

BY

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AND

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Superintendent, Trade and Customs.

The average daily quantity of toddy produced from a coconut palm is dependent upon a number of factors, the chief of which are enumerated below.

(a) *The age of the palms.* The majority of the palms tapped in the Federated Malay States are over eight years old.

(b) *The length of time in tapping.* Palms should be "rested" and although tapping may be continued for years, the Toddy Contractor usually aims at resting a palm for about four months after it has been tapped for eighteen months.

(c) *The health of the palm.*

(d) *The season of the year.* Generally the worst month for yield is December and the best month is July. Between December and June the yield is increasing fairly rapidly, remains high during June, July and August, and declines rapidly to November and December.

(e) *The skill of the tapper.* A good tapper will produce much more toddy from a palm than will an unskilful tapper.

(f) *Whether a palm is permitted to produce nuts.* Usually, palms are permitted to produce a certain number of fruits. If all the spathes except those tapped for toddy are cut off, a greater yield is naturally obtained.

(g) *Whether the palm is a tall or dwarf variety.* Most of the palms tapped are the ordinary tall variety. The dwarf palm produces less than the tall variety.

Approximately, the lowest yield to be expected in December is a daily average of 2.5 pints per palm. As a rough average throughout the year, 3.5 pints per day per palm may be expected. Individual palms vary considerably, and while some are not worth tapping, others have been known to yield as much as seven pints per day.

The ordinary task of a tapper is twenty-five to thirty, tapped morning and afternoon.

The above observations are based on experience gained at Batu Gajah, Perak, where fourteen tappers under a Head Tapper are employed daily to produce toddy for the Government toddy shops. About 420 tappable palms are available at this centre. They are rested in rotation—usually a complete task is rested and another task taken into tapping. The palms so rested for about four months

after eighteen months tapping have now been used for about eight years. The average of collecting pots is two per palm.

During the latter part of 1927 and early part of 1928, eight coconut palms in the compound of the Institute for Medical Research Kuala Lumpur were tapped twice daily by an experienced tapper. The yields of toddy from each palm were recorded. The age of the palms was not known but all were mature palms which were known to have borne fruit for at least thirteen years, and had not previously been tapped for toddy.

The preparation of spathes on palms A, B, 1, 2 and 3 was commenced on September 9th, 1927, and the collection of toddy on October 1st. The preparation of spathes on palms 5, 6 and 7 was commenced on September 29th, 1927, and the collection of toddy on October, 13th.

The yields of toddy from each of these palms for ten day periods are recorded in the attached table. The yields prior to October 9th were small and are not given in the table.

It is noteworthy that different palms gave very different yields of toddy, and also that the yields from individual palms varied enormously at different periods. The highest ten day yield was 65.9 pints from Palm No. 2 during the ten days ending 27.11.27. This palm yielded more than seven pints a day on fourteen different occasions, the highest daily yield being 8.5 pints on November 11th, 1927. The rainfall was normal during the period, being 50 inches for the six months October, 1927 to March, 1928, and included a wet season in October and a dry season in February and March. The considerable fall in yields in February and March coincided with the dry season, but experiments were not continued long enough to determine definitely whether there is any relation between rainfall and yield. The falling off may have been because the palms should have been rested.

The table shows that the maximum yield for the group of palms was reached about five weeks after the collection of toddy commenced, or about eight weeks after the preparation of spathes was commenced.

These figures relate to a small number of palms only, and it is not known if they can be regarded as typical of palms in the Kuala Lumpur district, or whether data obtained in Kuala Lumpur would be applicable to other districts.

Yields of Toddy in Pints.

10 days ending	Palm A	Palm B	Palm 1	Palm 2	Palm 3	Palm 5	Palm 6	Palm 7	Total 8 palms.	Average yield per palm per day.
18.10.27	13.76	11.88	4.81	30.87	15.11	11.85	8.27	5.61	102.16	1.277
28.10.27	22.74	28.23	12.23	48.28	28.18	27.72	22.23	17.29	206.90	2.586
7.11.27	33.07	33.53	26.26	55.98	36.24	38.18	28.72	24.67	276.65	3.458
17.11.27	32.01	31.52	33.94	65.54	34.06	45.10	34.97	32.96	310.10	3.876
27.11.27	40.15	34.18	33.97	65.92	25.17	41.98	25.60	44.54	311.51	3.894
7.12.27	28.05	32.91	30.88	55.51	25.25	41.59	22.95	47.49	284.63	3.558
17.12.27	28.45	37.29	34.85	51.64	30.03	37.41	28.97	42.98	291.62	3.645
27.12.27	41.17	37.18	24.42	53.93	27.59	25.69	23.29	26.03	259.30	3.241
6. 1.28	44.23	37.04	30.07	48.61	33.16	25.38	29.09	29.30	276.88	3.461
16. 1.28	32.93	30.88	32.96	34.94	28.85	25.64	22.23	28.63	237.06	2.963
Total 100 days	316.56	314.64	264.39	511.22	283.64	320.54	246.32	299.50	2,556.81	3.196

Yields of Toddy in Pints.

10 days ending	Palm A	Palm B	Palm 1	Palm 2	Palm 3	Palm 5	Palm 6	Palm 7	Total 8 palms.	Average yield per palm per day.
26.1.28	38.74	28.41	37.75	36.22	28.41	xx	19.32	34.02	222.87	3.184
5.2.28	28.51	17.99	29.29	44.21	15.70		15.82	25.09	176.61	2.523
15.2.28	33.91	9.82	30.62	31.68	12.71		21.22	32.03	171.99	2.457
25.2.28	9.66	6.29	27.59	7.65	15.08		18.53	22.09	106.87	1.527
6.3.28	7.15	12.40	18.46	13.56	18.57		16.13	29.27	115.54	1.651
20.3.28*	13.44	14.23	17.99	15.81	17.82		27.33	34.27	140.89	2.013
30.3.28	10.69	16.58	14.74	12.66	12.71		17.67	33.34	118.39	1.691
9.4.28	10.59	18.61	20.28	26.95	17.04		11.45	30.90	135.82	1.940
19.4.28	18.40	11.04	23.00	29.44	14.33		8.13	16.69	121.03	1.729
29.4.28	13.54	22.02	23.58	19.63	16.35		11.94	24.06	131.12	1.873
Total 100 days	184.63	157.39	243.30	237.82	168.70		167.54	281.76	1,441.13	2.059

Average yield per tree per day 2.665 pints.

* Palms were not tapped on March 14th, 15th, 16th and 17th.

** Palm No. 5 ceased to yield any toddy on 16.4.28.

Abstracts.

CINCHONA CULTURE IN JAVA*

Owing to the pressure of rapid exploitation of cinchona bark in the forests of Bolivia, stimulated by the constantly growing demand for the product, neither advice or legal regulation proved effective to stem the unbridled exploitation leading to the danger of the extermination of the tree in its natural habitat. This danger increased when, after the discovery that quinine was the most active febrifugal component, the commercial world had learnt to value cinchona bark according to the percentage of quinine it contained, and that from the analyses it appeared that the importation of high percentage barks from South America was constantly diminishing.

This position led to the first attempts of the Netherlands Government in 1852 to transfer cinchona from South America to Java in order if possible, to cultivate the plant in regular plantations. This decision was made not with any idea of financial profit, but to preserve for future generations a medical remedy which had become indispensable and to make it possible to obtain it regularly in adequate quantities.

Consequently, a Dutch expedition in 1852 and an English one in 1860 were sent to South America with the object of collecting as many cinchona plants and seeds as possible in order to transfer these to Java and to British India respectively. The Dutch expedition succeeded in collecting live plants and seeds of several varieties of cinchona. Of the 500 plants shipped only 75 were alive on arrival in Java. From the seeds, however, a great number of plants were raised.

The British expedition explored the western slopes of the Chimboraza and succeeded in delivering in British India more than 450 live plants and about 100,000 seeds of the *C. succirabra* variety.

Later, the British and Dutch exchanged the varieties that each missed, so that early in the sixties both countries possessed a fair number of cinchona varieties, of which the principal were: *C. lancifolia, C. cordifolia* and *C. Trianae* from Columbia; *C. succirubra* from Chimboraza; *C. officinalis* from Loja; *C. micrantha* and *C. Pahudiana* from Huanuca; *C. caloptera, C. Josephiana* and *C. Calisaya* from Caravaya.

With but few exceptions, all varieties thrived in Java, succeeding best on the planteau of Pengalergen and on the outrunners of the neighbouring moun-

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* Abstract of a lecture entitled "Cinchona Culture in Java. Its history and present situation" delivered by Dr. M. Kerbosch, Director of the Government Cinchona Plantations, Tjinjiuan, Pengalengen at the celebration of the 300th. anniversary of the first recognised use of cinchona, held in the Missouri Botanical Garden, St. Louis (U.S.A.) and published in Geneeskundig Tijdschrift Voor Nederlansch-Indie Deel 71 Aflevering 4; 1 April, 1931.

We are indebted to the Editor for permission to reproduce the two accompanying illustrations which appeared with the original article and for lending to us the blocks for this purpose.—*Ed. M.A.J.*

tains. By further shipments of seed from South America the number of available plants increased rapidly, especially as propagation by cuttings became a practice.

Subsequently, however, it was found that with the exception of *C. officinalis*, all the imported varieties possessed a low percentage of quinine. These barks were objectionable to manufacturers as the preparation of pure quinine from them was rendered more difficult by the relatively high percentage of total alkaloids. Moreover, *C. officinalis*, the bark of which was favoured by manufacturers, gave the least favourable growth and therefore the proposal that this variety should be grown extensively on plantations met with little response.

For a number of years previously the calisaya barks had been the most appreciated on the market. The planters in Java possessed four such varieties. In these varieties the barks appeared to contain an average quinine content of not more than 1—1.5 per cent. The position at this time was therefore, that although cinchona had been preserved from extermination, its cultivation did not promise to be an economic success, since cinchona with a high quinine content could only be produced in insignificant quantities.

It was about this time (1865) that a new variety of Calisaya seed was received from Charles Ledger. One pound of this seed was purchased by the Netherlands Government, and was sent to Java, while the remaining stock of 13 lbs. eventually came into the possession of the British Government.

The seed purchased from Ledger was planted by the Dutch in December, 1865 and resulted in 12,000 plants reaching the transplanting stage. Analyses of the bark of these trees from 1872 onwards showed a surprisingly high quinine content, ranging from 8 per cent. (the highest percentage found in 1872) to 13.25 per cent. (the highest recorded in 1876). Accordingly, with the increasing percentages of quinine found by analyses of Ledger trees, the Government plantations grew more and more exacting with regard to the qualities of the trees from which seeds and cuttings should be collected.

At this time the Netherlands East Indian Government had for the past 20 years established many plantations, and had spent much time and money on their investigations which had yet shewn no prospects of a reasonably profitable result. Private enterprise was not yet interested in the crop and the public looked on the project as an expensive hobby of the Governors General.

With the advent of Ledger cinchona, the cultivation of this crop assumed a new aspect and attracted private enterprises which accepted from the Government free supplies of seed and cuttings.

Relying on the experience of the Government estates, the planters selected soils of porous structure with much humus and of recent volcanic origin. Such lands at a suitable height above sea level were chiefly found in the Preanger Regencies on the slopes of the volcanoes and on the plateaus between them. This explains the fact that of the present 127 cinchona estates on the island of Java, 85 are in the Preanger Regencies and these together produce almost 75 per cent. of the total Java production.

Original Ledgeriana Trees, 60 Years Old.

Selected Weeding in a Freshly Planted Cinchona Garden.

The development of the cinchona industry owes much therefore to the Netherlands East Indian Government. The success of the policy is evinced by the fact that for many years past the Netherlands East Indian Cinchona Plantations have produced 97 per cent. of the total world production, while British India has produced 2.5 per cent. and the rest of the world .5 per cent.

Generally speaking, the Ledger cinchona is distinguished from the other Calisayas by botanical type and high quinine percentage.

Ledger cinchona was considered as the original form of the genuine Calisaya and named *Cinchona Ledgeriana.* Owing to the ease with which cinchona varieties hybridize, it is probable that *C. Calisaya,* which was found in the same district as *C. Ledgeriana* has been produced by hybridization from the Ledgeriana with other cinchonas.

This fact should be taken into account in order to obtain a correct appreciation of the results obtained with the Ledger seed.

Immediately after the results of the first analyses of Ledger barks had been received, the methods to be adopted were visualised to lie in the direction of encouraging the cultivation of this variety and of improving the Ledgeriana material as much as possible by selection. The general application of quinine as a remedy for Malaria and the indispensability of cinchona bark for its manufacture has justified the first view, while the following will shew the improvements made with Ledgeriana planting material.

In selection work on *C. Ledgeriana,* its high percentage of quinine and its botanical type were the two qualities taken into account. Trees were therefore selected which conformed to type and which possessed a high quinine percentage. Grafts from such trees were planted in isolated fields so that one could collect from them seed produced exclusively from cross-fertilisation of high percentage Ledgerianas. By this method not only was the constant supply of good cinchona seed maintained, but the quality was considerably improved.

The adoption of this method possessed the one serious defect that it led to excessive attention to the percentage of quinine only. Other factors such as vigour and thickness of bark were considered, but played only a subsidiary part in the ultimate selection. Thus the gross amount of quinine, namely the amount of bark produced, was inadequately taken into account.

It is obvious that the amount of quinine produced depends both on the percentage in the bark and the weight of bark produced. Bark production is therefore of equal importance to the quinine content of the bark. A method has been evolved by which a satisfactory estimate can be made of the quantity of quinine which is present at a given moment. The application of this method has elucidated the various factors influencing the production of quinine, such as the quality of the soil, manure and selection.

A large number of experiments have also been made on other cultural and technical points such as planting distance, method of cultivation, and manuring. Grafting methods have been improved and by grafting Ledgeriana cuttings on Succirubra stock it has been possible to produce the Ledgeriana bark on less

fertile soils where Ledgeriana seedlings would not thrive.

In these ways the culture of cinchona was raised to a very high level of technical perfection. The natural result was that Java cinchona culture was able to resist the long periods of depression which frequently occurred. The so-called "Dutch Cinchona Monopoly" has therefore come about by reason of the scientific advice which from the first has supported the cultivation of cinchona and the extraordinary perseverance of the Netherlands cinchona planters.

Over-production was the result of the successful cultivation of cinchona. While the consequent serious fall in prices resulted in the abandonment of this form of cultivation in favour of tea in Ceylon, Java planters concentrated on lowering the cost of production and improving the cultivation of cinchona to withstand these depressions. The maintenance of an adequate supply of cinchona is, therefore, entirely due to the perseverance of the Java planters, who persisted in their efforts in spite of unfavourable circumstances and in spite of the fact that the tea plantations held out better financial prospects.

The Dutch planter need not therefore pay great attention to the views expressed in articles in periodicals and newspapers in which the so-called Dutch Cinchona Monopoly is discussed in a manner which, as a rule, exhibits much unfriendliness, but little knowledge of the true state of affairs. After Ceylon abandoned cinchona cultivation and after most of the private planters in British India had also given it up as not being sufficiently profitable, the Netherlands Indies remained practically alone as a producing country. The so-called monopoly of the Netherlands Indies has therefore come about in an entirely natural way, the way which led to the "survival of the fittest."

Such a monopoly resulting in a main producer is entirely different from monopolies created by special laws and maintained by official regulations. The Netherlands East Indies Government has never tried to maintain a monopoly of cinchona bark production; on the contrary it has repeatedly given its highly selected cinchona seeds to those colonial governments who wished to grow cinchona bark, thus sparing them the trouble and difficulties of work of selection.

It may now properly be asked, what obligations does the special cinchona position impose upon the Netherlands East Indies?

Statistically it is shewn that 650,000,000 people, or a third of the human race, are suffering from Malaria, while 2,000,000 die annually from this cause. For the treatment of these patients 26,000 tons of quinine per annum would be necessary. The conclusion that the production should be increased to 26,000 tons of quinine per annum is exclusively based on theoretical considerations and has no connection with the actual requirements demanded of an economic system of production. Millions of sufferers are so poor that they would be unable to purchase quinine at even the approximate cost of production. In practice the production of quinine can only take into account the law of supply and demand.

Cinchona growers in the Netherlands East Indies certainly will not agree with Dr. Balfour, who is responsible for the above-quoted figures, and who thinks that an International Committee should be appointed in order to see how the

production of cinchona bark can be raised considerably. Such a committee would first have to answer the question: how the large stocks owned by Cinchona growers at present and also their normal production can be used to the benefit of malaria stricken countries whilst, at the same time, the cultivation of cinchona is safeguarded and may be maintained on an economically sound basis. It is evident that this question deserves to receive the attention of the League of Nations.

Moreover, this question is of the greatest importance when Malaria has to be suppressed. In support may be quoted the resolution of the Malaria Commission of the League of Nations. "The first and most important thing to do in malarious localities is to arrange for the treatment of the disease by quinine."

While the provision of inexpensive quinine is of great importance, it is clear that as long as interested parties in the struggle against Malaria do not sufficiently take into account the conditions that make quinine production economically possible, all discussions about lower prices and larger production will be vain and worthless.

On this question the Dutch cinchona bark and quinine producers have tried to come into contact with the Malaria Commission of the League of Nations. It has now been arranged that the matter will be discussed by representatives of the Kinabureau and delegates of the Commission. The Kinabureau has also tried to interest the Health Board of the Rockfeller Foundation. The Dutch cinchona planters and quinine manufacturers will be found ready to give all possible assistance if the Foundation decides to apply itself to this task.

The cinchona planters have attempted to preserve an economically profitable cultivation by means of the Cinchona Agreement.

In the past the planters, who were totally unorganised, suffered periods of depression owing to over-production. Manufacturers were the real masters of the market as they had for some years reached a certain degree of co-operation, consequently, it was noticeable that during low prices for the bark there was an ample margin between the prices for quinine in the bark and the quinine as a market product.

Unanimity amongst producers, however, was not reached until their estates had once more been placed in a critical position during the years 1910/1912, owing to the low prices of bark. The new organisation of bark producers opened up negotiations with the quinine manufacturers leading in July, 1913 to the Cinchona Agreement. Until to-day this co-operation has been maintained by fresh agreements. The control of the correct execution of this agreement is entrusted to the Kinabureau in Amsterdam, which is constituted of 6 representatives of the planters and 6 of the manufacturers. The co-operation between producers and manufacturers is not a "trust" arising from a desire to exploit a monopolistic position, but a result exclusively of the imperative need for putting an end to the great variations in price which jeopardised the security of the bark producers. The main object of this cinchona agreement is and will be to ensure as far as possible the continued existence of an economically pro-

fitable cultivation of cinchona.

The agreement has existed for 17 years during which time it has not abused its position by the unreasonable forcing up of prices.

The Government has greatly helped towards making the Cinchona Agreement and as a bark producer, has become a signatory to this agreement, being convinced of its economic importance to the industry. It is absolutely out of the question that the Government, either directly or indirectly, would participate in a measure which would serve as a means of unreasonably forcing up the price of cinchona bark with an eye to purely mercantile considerations. The Government has throughout taken the attitude that they desired to assure a regular production in order to place it within the reach of as many people as possible. A further proof of the official attitude is that Government reserves to itself the right to withdraw from the Association if it is of opinion that the Cinchona Agreement forms an impediment to the supply of cheap quinine to the malarial districts.

The interest of producers cannot lie in a "trust" for forcing up prices, but demands the sale of as much quinine as possible at prices at which a profitable cultivation can be maintained permanently. It is therefore logical that the producers will try, side by side with a normal sale of quinine, to supply as large quantities of quinine as possible at very low prices with a view to the quininisation of malarial regious with impoverished populations.

Without the Cinchona Agreement, the supply of cheap quinine to malarial districts would by no means be assured. Quinine would then frequently become a speculative article in the hand of middlemen who would not be concerned in the supply of cheap quinine to impoverished sufferers from malaria, and the various Governments would not have the assurance of adequate supplies of cheap quinine for many years, a certainty which the Cinchona Agreement now furnishes them.

However strange this may sound, it is precisely the much discussed "Cinchona Trust" which offers the best chance of supplying the malarial regions with cheap quinine.

SHIPMENT OF PALM OIL IN BULK. *

The "Huileries du Congo Belge" are now, regularly and satisfactorily, shipping large quantities of palm oil in bulk.

Palm oil in large quantities is more difficult to handle than other commodities; it requires great and constant care and conditions of perfect cleanliness, and especially is this the case for the superior qualities intended for consumption as food.

The previous method of shipping in wooden barrels of a capacity of about 630 kilograms (about 160 gallons. *Translator*)—proved unsatisfactory because of the difficulties in assembling and handling these heavy barrels and the leakage which amounted to as much as 3 per cent. Local manufacture from locally grown timber proved impracticable and steel drums were also unsatisfactory. If sent out assembled, their landed cost was prohibitive; those sent out in parts to be assembled locally were less costly but did not give full satisfaction, and it was found troublesome to get them back afterwards from the oil dealers. Their capacity was 500 kilos (about 127 gallons. *Translator*).

When, however, the quantities of oil to be shipped became increasingly large, shipment in barrels proved inadequate, especially owing to the difficulties of local transport. It became necessary to make arrangements for shipment in bulk.

Lord Leverhulme, after visiting the Congo in 1912, had already proposed the laying of a pipe-line from Léopoldville to Matadi. Though it has not been possible to carry out his vast scheme in all its details, the oil from our factories on the Upper Congo is now being shipped in bulk all the way to the factories in Europe and the United States of America.

This transport has been organised as described below :—

The oil, produced in the factories on the Upper Congo is, after classification, pumped into storage tanks of 200 tons capacity. From there it is pumped into special tank barges. The oil all the time is under control by our chemists. All tanks are built in independently of ships' hulls and their interior equipment has been reduced to a minimum in order to facilitate cleaning by means of jets of steam. The double hull is a great safeguard in case of accidents. These barges have been found very satisfactory and very few modifications have been necessary since the first ones were built. They are equipped with permanent suction pipe installation for discharging.

After arrival at Léopoldville the barges are moored alongside one of the Company's pontoons which are equipped with powerful pumps and steam boilers. The oil is pumped into large storage tanks, according to its quality. The greater part of the oil is of superior quality containing a small percentage of free fatty acids. These tanks too, are under the permanent control of the chemists.

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* Free translation of an article published in *Bulletin des Matiéres Grasses:* Vol. XIV, No. 9. 1930.

On both the Congo and the Kasai river these barges are used; the largest can carry 300 tons of produce of which 200 tons is palm oil in bulk.

A new departure has been made by the use of tank wagons, running between Léopoldville and Matadi and the building of a second depôt at Matadi for the storing of the oil before its shipment in the ocean going tank steamers.

We had at first thought that it would be useful, if not necessary, to build the wagon in such a way that it could serve the double purpose of carrying a cargo of merchandise for the return journey to the interior, but none of the various designs submitted answered this purpose. So we decided to build the tank wagons for the purpose of carrying oil only without troubling about a cargo for the return journey; some day they may be useful for carrying a liquid cargo inland.

As the tank wagons had to conform to the requirements of the rolling stock of the railways and had to keep within the rules for the proportion between load and tare, we built tanks with a flat bottom and a nett capacity of 20 tons; the tank is mounted on a chassis very similar to the standard type of 765 mm width; this tank design gives the largest unit that the height of the centre of gravity of the standard chassis and the sharp curves of the track will allow.

Fifty-five tank wagons have been put into use by the Huileries du Congo Belge; they can easily be converted to run on the 1.06 meter wide track of the factory yards and are fitted with pneumatic brakes and automatic couplings. They have given no trouble other than overheating of the boxes, due to no constructional defect, but to the local conditions, especially during the dry season to the prevalence of dust. We have experimented with a special type of box in which the oil circulates permanently. The reports received show that this new type is superior to the standard type with white metal cushions.

Regular cleaning of the tank wagons is essential and is done under strict control; the insides of the tanks have been kept as smooth as possible with the smallest possible number of rivetheads or other projections.

At present, our wagons on the average make only two round trips a month; improvements now being made to the track will, we hope, soon make it possible to make three or four round trips per month and per wagon. We even hope that in the near future it will be possible to run special oil trains that will do the journey from Léopoldville to Matadi in a single day; that would give six to eight round trips per month per wagon allowing for upkeep and overhauling.

The storage tanks at Matadi now have an aggregate capacity of 3,100 tons. There is also a powerful pumping plant and pipe lines for loading the ocean going steamers at the rate of 90 to 100 tons per hour. As each steamer takes 1,000 to 1,500 tons, loading can be completed in one day and this greatly reduces wharfage charges and does not cause any inconvenience to the regular steamer services.

Particular care is taken with the inspection of the ships' tanks and with keeping them in perfect condition, especially as regards cleanliness. A member of the Company's technical staff exercises constant control and is also in charge

of the gauging. The loading is further supervised by the Customs Officers, controlling all operations. The satisfactory result of these methods of bulk shipment is evident from the fact that the total loss of weight is below 0.25 per cent.

As palm oil, even of superior quality, hardens at a comparatively low temperature, it is necessary to make special provision for ensuring that it is in a fluid condition at ports of destination in northern latitudes, especially in winter. The tanks have to be equipped with steam pipe coils and the heating must be under close control prior to arrival at port of destination, as otherwise heavy expenditure would be incurred in unloading.

According to circumstances, Duplex pumps or centrifugal pumps can be used, but all details of their construction and the materials of which they are made, have to be studied carefully beforehand to ensure uninterrupted working and absence of risk of contamination of the oil. For that reason, all built in pumps or pipe coils are ruled out for ships' tanks owing to the difficulty of cleaning them properly. The pipe coils must be of a pattern that can easily be taken to pieces; we have in fact used only movable pumping material. The pipe line too, has to be heated, but it is essential to avoid all direct contact of the oil and the steam.

The Company has also had to erect quay installations in ports of destination for unloading and storing the oil and for forwarding it to the factories.

The foregoing will have made clear the importance of the organisation described; one of its effects has been to relieve the task of the railway and the work at Matadi port. The transport of 10,000 tons of palm oil in barrels would involve handling on the quay and railway transport of more than 20,000 barrels twice, once when arriving empty and once more when going out filled.

Economically, bulk shipment of palm oil does not pay unless the quantity shipped is over 750 to 800 tons per month.

So far we have not yet shipped palm kernels in bulk. Technically it would not seem difficult to organise and the question is under consideration. The organisation of bulk shipment of palm oil will, in fact, make it easier to adopt more modern methods of transport for other products of this Colony.

PADI IN NEW SOUTH WALES.*

Padi has been grown on a commercial scale in New South Wales only since 1924 when 143 acres produced a crop which averaged 65 bushels per acre (1 bushel of padi = 42 lbs.). A permanent Rice Research Station was established in the irrigation area (Murrumbidgee) in 1928, its chief objectives being experiments in (a) breeding and selection of varieties, (b) methods of preparation of soils, (c) optimum seed rate, (d) best time for sowing, (e) use of fertilizers, (f) the control of weeds, and (g) the best crop rotation—at present the best rotation has been found to be rice, fallow, wheat or rice, wheat, fallow.

The estimated annual consumption of rice in Australia is 15,084 tons, while the production from 14,319 acres in 1928—29 was 14,857 tons (24,000 tons padi), so that local requirements are almost met by the present local production. The Murrumbidgee area covers some 79,000 acres, so that there is much room for expansion of production if foreign markets can be found for the rice, or if local consumption can be stimulated.

The retail price of imported (Patna) rice is 6-6½ pence per lb. whereas locally produced rice is sold at 3½-4 pence per lb. The local cost of production of rice, including interest on capital, (15 per cent.) marketing expenses and storage, etc. amounts approximately to £13 per ton, or 1.39 pence per lb.

The difference between the cost of production and retail prices are accounted for by (a) rail freights, (b) inspection, (c) insurance, (d) cartage, (e) receiving at warehouse, stacking and storing, (f) loss in transit, (g) milling, bagging, and loss in weight, (h) overhead charges and distribution charges, (i) millers' profits, and (k) Marketing Board charges. All these charges amount to approximately £7.12.0 per ton and their reduction should be investigated. To stimulate local production it is suggested that the protection of 1d. per lb. be raised to 1½d. per lb. on all imported rices and that foreign markets should be sought for surplus production.

* Summary of the following two publications: "Rice Growing," published by the Department of Agriculture, N. S. W., and "Tariff Board's Report and Recommendation on Rice," published by the Commonwealth of Australia 1930.

DERRIS ROOT INSECTICIDES.

The value of Derris root in combating the warble fly pest, which does such serious damage to cattle hides, is discussed by R. C. Gant, M. Sc., Agricultural Organiser for Worcestershire, in the "Yorkshire Post."

Following a season of preliminary trials in 1928, Mr. Gant points out, some very definite experiments were carried out in 1929. Among the six preparations used one was so convincing as regards its action in killing warbles, ease of preparation and application and relative cheapness, that it met all the standards laid down for a remedy of the first order. Derris powder, soft soap and water constituted the sole materials of the wash, which, for want of a better name was called derris-soap-wash. The formula was as follows:—Derris powder 1lb., soft soap ¼lb., water 1 gallon.

During the winter, 1929—30, the Agricultural Education Sub-committee for Worcestershire formulated the area demonstration scheme which was carried out in fifteen areas of the county of Worcester between March and June of this year. The National Farmers' Union co-operated so enthusiastically in the movement that some 10,000 head of cattle were dressed four times according to the instructions and conditions laid down in the scheme. In this area demonstration scheme not only was the experimental evidence reviewed and supported; it was corroborated by 244 farmers in the county of Worcester, whose cattle were dressed. Confirmatory reports have also been received from a number of counties which carried out during 1930 a scheme of dressing modelled on Worcestershire recommendations.

One point from the recent Worcestershire work is that while the soluble toxin alone may be a factor in warble destruction, the additional advantage of the suspended powder in the wash must not be overlooked. The fine particles carried in the soapy wash during dressing effectively plug the breathing holes of the grubs, causing death by suffocation. There is thus a dual action, which makes a 100 per cent. kill quite possible. Stress is, therefore, laid upon keeping the wash well agitated by means of the cloth and hand so that little or no "mud" remains at the bottom of the vessel when the liquid has been used up.

Farmers intending to follow the method advised for destroying warbles are warned that they must obtain Derris powder of proved merit; this is not difficult. Large consignments are imported annually into this country, some being specifically cultivated and some consisting of the roots of plants growing wild.—*The Chemical Trade Journal and Chemical Engineer,* January 9, 1931.

MALAYA AT THE BRITISH INDUSTRIES FAIR, 1931.*

The Fair was held simultaneously at Olympia, the White City and Birmingham, from February 16th. to 27th., 1931. Malaya was represented by a Stand in the Empire Marketing Board Section at Olympia. Visitors to Olympia totalled 170,000 representing an advance of 20 per cent. on last year's figures, and came from 74 different countries.

As in previous years, it was endeavoured to set out as comprehensive an exhibit as possible of Malayan products, though once again prominence was given to Oil Palm products and Pineapples. Pineapples occupied a counter extending the whole length of one of the frontages, while the oil palm exhibits were grouped on a central pedestal.

The decorations of the Stand consisted of cut-outs, posters, weapons and implements, "sarongs," basketware and artificial flowers.

The pineapple exhibit consisted of canned fruit in all packings and under a wide variety of labelling and, for the first time, included some very satisfactory samples of crushed pineapple, which should find a ready market for use in the making of jam and confectionery. For the first time, too, ¾ lb. sample tins of pineapple slices were available for sale to the public at 3d. per tin. Each such tin had a specially printed label worded "Malayan Pineapple, Exhibition Sample" and made reference to no particular firms of importers or cannery. The supply of these sample tins was exhausted half-way through the duration of the Fair.

During the morning hours the Stand performed valuable service every day in effecting a liaison between importers of pineapples and retailers, and the great number of enquiries received from foreign buyers gave an illuminating sidelight on the enormous market that might be developed on the Continent for Malayan pineapples. In the afternoons there was constantly an interested crowd listening to talks on the culinary merits of Malayan pineapple and sampling the fruit set out in glass vessels for that purpose. For 6d. members of the public were supplied with a carrier bearing the words "Malaya" and "Buy Singapore Pineapple and Support the Empire" and containing a sample tin of pineapple, a receipt booklet, and a pamphlet describing the growing and canning of the fruit. Demonstrations were also given to shew how housewives anxious to use crushed pineapple, but unable for any reason to obtain it, can make it for themselves by passing cubes through an ordinary mincing-machine.

A fair number of enquiries for oil palm products were received and were handled direct from the Stand.

Other enquiries were concerned with basketware, essential oils, Illipi nuts, Produce Cards, oil palm shell charcoal and coconut shell charcoal, and various rubber products. The lastnamed were referred to the Rubber Growers' Association Stand, situated only a short distance away.

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*Abstract of Report by Mr. H. S. Banner, Publicity Officer, Malayan Information Agency who was in charge of the Malaya Stand throughout the duration of the Fair.

Literature on all subjects relating to Malaya was available gratis to the public and for this there was a sustained demand, especially from school teachers and students. The enquiry for "Malayan Statistics" was particularly satisfactory.

On February 17th. the Stand was visited by Her Majesty the Queen, the Duke and Duchess of York, and the Duke of Gloucester, accompanied by Miss Margaret Bondfield, Minister of Labour.

As the Royal party approached the Stand, Syed Jaffar, a Penang Malay engaged as an attendant, saluted the Queen with the traditional obeisance of his people, a tribute which Her Majesty graciously acknowledged.

Other distinguished visitors were the Prime Minister, the Lord Mayor of London and the Rt. Hon. J. H. Thomas, M.P.

PUBLICATIONS OF THE IMPERIAL DEPARTMENT OF AGRICULTURE IN INDIA.

The Imperial Council of Agricultural Research has reorganised its publications from the beginning of 1931. The new series are, "The Indian Journal of Agricultural Science," "Agriculture and Live-stock in India" and the "Indian Journal of Veterinary Science and Animal Husbandry." The above publications will take the place of the "Agricultural Journal of India," the "Journal of the Central Bureau for Animal Husbandry and Dairying" and the Memoirs and Bulletins of the Imperial Department of Agriculture in India.

The *format* of the new publications closely follows that of the *Malayan Agricultural Journal* an arrangement which we do not claim originated with us, but which we are pleased to note is becoming more generally adopted for publications of departments of agriculture.

Miscellaneous Article.

SCHOOL OF AGRICULTURE, MALAYA.

Official Opening Ceremony.

The new School of Agriculture, situated at the Government Experimental Plantation, Sedang, Selangor, was opened by His Excellency the Officer Adminstering Government, S.S. and Acting High Commissioner, Malay States, The Hon'ble Mr. John Scott, C.M.G., at 5 p.m. on May 21st., 1931.

The Guard-of-honour, composed of the band and 50 men of the Selangor M.V.I., under the command of Captain Georgi, O.B.E., with Lieutenant Raja Mushahar was inspected by His Excellency who was met on arrival by the Director of Agriculture, Dr. H. A. Tempany, Principal of the School.

Previous to the arrival of His Excellency, military honours were accorded to Their Highnesses The Sultan of Selangor and the Yang di Pertuan Besar of Negri Sembilan and also to the Hon'ble the Chief Secretary to Government.

After inspecting the Guard-of-honour, His Excellency was met by the members of the Advisory Committee of the School and proceeded to the Hall where he was met by a large and representative gathering of officials and unofficials.

The Director of Agriculture, Dr. Tempany, in calling upon His Excellency to open the School stated that the establishment of the School is an important step which has been taken after prolonged deliberation, for the proposals to establish an Agricultural School in Malaya have been under consideration for the past 18 years, the scheme for the present institution being evolved some 5 years ago, while the erection of the buildings has occupied 2 years.

The objects which the school is intended to fulfil are to provide a grounding in the sciences which underlie agriculture, combined with practical training in the agriculture of the principal tropical crops and elementary instruction in subjects some knowledge of which is essential to the make up of a competent agriculturist.

The Director emphasised that while long practice was essential to a knowledge of agriculture, efficiency may be greatly enhanced with the aid of instruction.

After allusion to the advantage which had been taken, in founding the present School of Agriculture, of the experience of other countries where such schools have been operated with success, the speaker congratulated the architects and the engineers of the buildings. He added that the proximity of the School to the Experimental Station will greatly assist the instruction work.

The School, which has accommodation for 80 students, opens its doors with about 50 pupils. While the School was founded primarily for the training of Asiatics for the Government agricultural services, the more important direct purpose of the School is that of creating a class of trained men who can be employed as assistants on estates or on the working of their own

The School of Agriculture, Malaya
at
Serdang, Selangor.

properties.

"There are few if any countries," continued Dr. Tempany, "which are more favoured naturally than Malaya, possessing as it does a fertile soil, a well distributed reliable and abundant rainfall, an equable temperature and a wide range of agricultural conditions; there is hardly any tropical crop which could not be satisfactorily grown within the compass of its 52,000 square miles. Moreover, thanks to the abundant prosperity which has been its lot in the past it possesses a magificent system of roads and railways, and river transport is fairly easy in the more remote undeveloped sections. The facilities for development are therefore great, and yet the country is dependent on outside sources for many necessities which could be produced locally. Its agricultural prosperity has been built up largely on one product, with the cessation of restriction and the world slump has come overproduction and a drop in market prices to ruinously low levels. So far the only answer which the country has yet returned to the difficulties engendered by the crisis is to produce more rubber and yet more rubber. It is a difficult thing for a country to change or to broaden its ideas on the subject of production; nevertheless there is abundant food for thought when one realises that last year Malaya imported $139 million worth of articles capable of being grown in this country. This includes 66 million dollars worth of rice, 27 million dollars worth of produce of animal husbandry, i.e. meat, milk, butter and eggs, 24 million dollars worth of tobacco, 10 million dollars worth of fresh fruits and vegetables, 4½ million dollars worth of tea and coffee.

For Java the corresponding figures for net imports are approximately—

Rice	57 millions
Animal husbandry products	15 ,,
Fruits and vegetables	7 ,,
Tobacco, tea, coffee and sugar	Nil

and this for a population of 40 millions as against our 4 million. In the Philippines the position is somewhat similar. In both these countries the aim of their Governments has been to stimulate local production and I have reason to believe that the result of this policy has been substantially to mitigate the severity of the present crisis for the inhabitants. I am certain that conditions in Malaya are naturally as favourable to diversified production as are conditions either in Java or the Philippines. It is clear that the present depressed condition sooner or later will pass, but one cannot expect that they will not recur again, greater diversification of production especially with a view to lessening imports seems therefore to be most effective palliative and guarantee for the future.

"The opening of this School," continued the speaker, "is an event of considerable significance as it definitely marks a step towards defining agricultural policy on lines which have already borne valuable fruits in neighbouring countries and quite possibly may prove the forerunner of other steps on parallel lines which will eventually enhance the stability of Malayan agriculture."

The speaker explained that while the School has been founded and is supported by the Straits Settlements and the Federated Malay States Governments,

yet its pupils are coming for all parts of Malaya; for whatever may be the political boundaries between different parts of the country he is convinced that an agricultural policy for Malaya should recognise no such limitations.

The School starts under favourable condition having an admirable site, buildings and equipment. The Government has further appointed a strong Advisory Committee. The result will depend very largely on the staff of the School, the support which it receives from the public and on the pupils themselves. The speaker stated that he is persuaded that Mr. Mann, the Vice-Principal and those associated with him fully realise the important and responsible character of the duties entrusted to them, and he feels assured that not only will they justify their positions, but that every member of the staff of the Department of Agriculture will be willing and anxious to assist towards achieving the success of the aims of the School.

In asking His Excellency to declare the School open, the Director gave an assurance that whatever be the difficulties encountered, the Department would use its best endeavours to deserve success in this important enterprise.

On rising to open the School, His Excellency stated that by his presence he was fulfilling a promise which he made to Dr. Tempany six months ago when he visited the Plantation and inspected the buildings then nearing completion.

In the first place he wished to congratulate Dr. Tempany, the Advisory Committee and the officers of the Department on the successful consummation of this scheme. It must be a matter of supreme satisfaction to them to be able to mark to-day the finish of their work by the opening of the School. He associated himself with the Director in congratulating the Director of Public Works on the erection of this dignified and adequate group of buildings, which had been built for the very reasonable sum of $370,000 and he extended his congratulations also to the architects and the engineers for their share in this work.

He desired further to congratulate the staff and first students of the School on having this fine Institution and on the unique and grand opportunity which now lies in their hands, for on them will depend the whole future success of the School.

Agriculture is of paramount importance to the Malays of this country. Natural conditions of climate, rainfall and soil are suitable and there are few fruits of the earth which Malaya cannot produce, and produce well. The growing of foodstuffs is in some respects more important than the growing of rubber. We grow too much rubber, but we grow too little foodstuffs. The figures quoted by Dr. Tempany of the value of imported foodstuffs are appalling and constitutes a very grave reproach and danger to this country.

Continuing, His Excellency said, "If the old-established methods of agriculture existing in Malaya continue unchanged, one can see little prospect of the present deplorable situation improving. We must improve those methods, we must apply the practice and experience of science to improve them, we must disseminate far and wide over the country new and improved and scientific methods of agriculture. And, in the establishment of this school I see the begin-

nings and the hope and prospect of teaching, applying and disseminating better knowledge and better methods, so that if Malaya cannot become entirely self-supporting in the matter of foodstuffs, it may be least become a great deal more independent of imported materials than it is now.

"This school will train native instructors to teach the villagers how to grow their present crops better, how to breed and care for their domestic animals better, how to grow new sorts of crops.

"This school will also, I hope, teach these things to numbers of villagers themselves who will then return to their kampongs and put into practice the knowledge they have acquired and thereby set an example to their fellows.

"If the high aims and the high hopes of the originators of this school are fulfilled—if staff and students alike live up to the standard and ideals set them —then I foresee an increasingly valuable and successful future in store for the school. It is with that vision before my eyes and with that hope in my heart that I now declare open this School of Agriculture."

Speaking as a member of the Advisory Committee of the School, the Undang of Rembau in thanking His Excellency for his presence, stated that this was proof that the Malayan Governments had the agricultural prosperity of the country at heart. He also welcomed Their Highnesses the Sultan of Selangor and the Yang di Pertuan Besar of Negri Sembilan. Their Highnesses, he stated, had always shewn a keen interest in the welfare and prosperity of their respective States.

The criticism had lately been expressed that the Malay schools were capable of producing nothing but men suitable for employment as clerks. By the provision of trade and technical schools, Government had take steps to enable the local youth to qualify for other forms of employment. The School of Agriculture was another valuable and welcome addition which could be utilised to remedy that unsatisfactory situation.

"Speaking as a Malay," said the Undang, "I would like to express my hope that my countrymen will take advantage of the facilities which this School affords." He hoped that the School would in due course make its proper contribution to the economic advancement of the country.

Speaking, in the absence through indisposition of the Hon'ble Mr. Tan Cheng Lock on behalf of the Chinese, Mr. Choo Kia Peng, C.B.E., said that the Advisory Committee, Dr. Tempany and his staff deserved the thanks of everyone connected directly or indirectly with agriculture for their work in bringing the School to completion. He hoped that the Chinese would take advantage of the facilities offered, and on behalf of the Chinese, wished the School every success.

The Hon'ble Mr. S. Veerasamy associated himself with the remarks of the Dato of Rembau and Mr. Choo Kia Peng, and congratulated all concerned on the inauguration of the School.

The gathering then broke up, Dr. Tempany inviting all to inspect the buildings. Refreshments were served in the hostel dining-hall.

Departmental.

FROM THE DISTRICTS.

The Weather.

With the exception of parts of Perak, the weather throughout the Peninsula was normal for the month, being cooler than in April and with an average rainfall provided by frequent showers and occasional heavy thunderstorms in some localities. In parts of Perak, however, the weather was warm and the rainfall well below the average for May.

Remarks on Crops.

Rubber.—Local prices for rubber from small holdings were slightly lower than in April, being $8—$13 per picul for smoked sheet, $6—$12 for unsmoked sheet and $2—$7 for scrap. In Ulu Langat District of Selangor, small-holders are reported to be preparing lump rubber instead of sheet and to be selling it at $3.50—$4 per picul. As the lump rubber contains much water and requires little labour for its preparation the return obtained is approximately the same as from sheet. The production of this lump rubber and the comparatively steady price offered for scrap indicate the existence of a definite demand for a raw product in its simplest form.

In spite of the sustained low price of rubber, small-holders in Kedah have continued to tap their trees severely. On the other hand, however, a definite increase in the number of holdings and small estates owned by Asiatics on which tapping has been stopped is reported from Penang and Province Wellesley, Perak South, Pahang East, the Negri Sembilan and Malacca. In Malacca and possibly also in the Negri Sembilan, the increase of untapped holdings may be due to the commencement of padi planting operations. It was estimated that in Penang 75 to 80 per cent. and in Province Wellesley 70 per cent. of the small holdings were not tapped, the only holdings in tapping being those of which the owners have no other source of income.

It was also noticed that where an owner had some other produce that brought him in a little money, he only tapped a sufficient number of trees to make this amount up to an average daily wage. In nearly all cases the trees were tapped by the owner and his family.

Oidium Leaf Mildew was found to be prevalent in Province Wellesley South, but the attack was mild owing to the showery weather which also caused a decrease of the disease in the Negri Sembilan and Malacca.

The same weather conditions, however, favoured the development of Mouldy Rot disease. Control measures were carried out satisfactorily in most infected areas except in parts of Pahang West where enforcement may be necessary. In Selangor a strong reluctance to purchase better quality fungicides was becoming increasingly apparent.

Padi.—The stem borer *Schœnbius incertellus* was found to be present in many padi nurseries in the inland Districts of Selangor. Counts made during the transplanting of Seraup strains at the Kuang Padi Test Plot showed infections of 4.5 per cent. in Seraup 48 and 4.8 per cent. in Seraup 36 in spite of the destruction of infected seedlings in the nursery. All plants were dipped in tuba root extract before planting. Another stem borer, *Diatraea* sp., was found to be damaging nurseries at Jambu Rias in Bentong District of Pahang.

Most of the stock of 1,000 gantangs of pure strain seed obtained for the Negri Sembilan has been sold to padi planters and a further supply has been ordered. In Malacca 535 gantangs of seed of the strains Siam 29 and Nachin 10 have been distributed to local headmen for trial during the coming season.

Coffee.—The local prices offered for coffee have remained low and about the same as in April, but they continue to vary considerably in different districts. Thus, while the general range has been 9 to 14 cents a kati (1⅓ lbs.), in parts of central and southern Perak and in Temerloh District of Pahang it has been 12 to 18 cents, while in Kedah $16.20 per picul is recorded.

The outbreak of the Coffee Hawk Moth, *Cephanodes Hylas* at Bukit Kapar in Selangor continued to be well controlled, while that at Ujong Permatang, after causing considerable damage, was controlled by hand-picking and by the use of a solution of disinfectant and tuba root prepared by the Chinese growers.

The Coffee Berry Borer, *Cryphallus Hampei,* was found on a small isolated area of coffee at Lukut in the Negri Sembilan, nearly six miles from the nearest known infected area.

On an area of about 400 acres of coffee successfully established in an estate in Johore, root diseases and the Red Stem Borer have done slight damage.

Tea.—All the tea fields at the Government Plantation, Cameron's Highlands, produced a definite flush of leaf in April, thus following very closely the habit of the plant at this period of the year in more nothernly climates.

This leaf when manufactured, has almost an abnormal percentage of "golden tip"; thus a "showy tea" that apart from any other characteristics, will always find a place for itself in the blenders' art.

The point of value, however, is the fact that as the tea plants mature in this climate, they take on more of the characters peculiar to them in more temperate regions.

The price of local Chinese grown tea in Selangor remained the same as in April, namely 48 cents per kati for first grade and 24 cents per kati for second grade. There was a further improvement in the management of the tea area owned by Chinese at Sungei Balak, while the results of the manurial trial laid down there in the previous month were very striking.

Tobacco.—The interest in this crop is being well sustained by the Chinese growers in Province Wellesley. Fresh crops were sown during the month, including seed of Jaffna and Javanese varieties distributed by this Department. Considerable difficulty was, however, experienced in the control of leaf eating

caterpillars and the Tobacco Stem-borer *(Gelechia heliopa)*. A demonstration of control by spraying has been arranged.

The headman and local Malays at Batu Kurau in Perak have begun to plant tobacco from seed obtained for them by this Department from Kedah and Province Wellesley. A Chinese variety of tobacco grown near Degong in southern Perak was sold for 40—50 cents a kati.

Food Crops.—Wherever land is available, more particularly land under jungle, as in parts of Kedah, Perak, Pahang and Johore, Malay and Chinese small-holders are taking much interest in the planting of supplementary food crops, especially hill padi, maize, sweet potatoes and tapioca, often with bananas to follow as a more permanent crop.

Fruits.—In Province Wellesley local fruit trees, such as durian, mangosteen and rambutan were carrying good crops of growing fruit. In the Muar District of Johore many fruit trees were flowering.

Vegetables.—An interesting result was obtained from a manurial trial on a Chinese vegetable garden in Kuala Lumpur. A complete fertiliser was supplied by a local firm and the yield of onions from the plot was compared with the yields obtained from similar plots manured with fish and prawn sweepings. The complete fertiliser gave an increase of 50 per cent. as compared with the fish and prawn sweepings, while the costs of the applications were in favour of the complete fertiliser. This result, combined with a similar successful experiment conducted in the previous month with leaf vegetables, has attracted much interest among Chinese gardeners. It is possible that the beneficial effect of the slower-acting fish manure may prove more lasting than that of the quicker-acting artificial fertiliser.

Live Stock.—One pair of Large Black pigs, two Middle White sows and one boar of the same breed were obtained from the Government Experimental Plantation, Serdang, by Chinese gardeners during the month.

There was a further decline in the wholesale price of live pigs.

Notes on Agricultural Stations and Padi Test Plots.

At the Telok Chengai Rice Station in Kedah trials were made of rolling the stubble of the last season's crop to hasten decay. The results were satisfactory. Good showery weather was experienced and both stubble and straw rotted well.

On the Kuang Padi Test Plot in Selangor, stumping, levelling and consolidating the bunds were carried out during the month and resulted in considerable improvement. Transplanting of the long-maturing Seraup strains was completed at the end of the month.

The lease of the Dong Padi Test Plot in Pahang was renewed and considerable improvements to the lay-out of the plot and to its surroundings were effected.

Possession was obtained of padi land in the Rembau sub-district of Negri Sembilan and work was commenced on its preparation for planting in the coming season, particularly on improvements in the supply of irrigation water and the rearrangement of the bunds.

Plant Distributions.

Considerable quantities of yams, both Greater and Lesser, sweet potatoes, maize and vegetable seeds were distributed during the month, principally to school gardens. Orange marcots were sent from the Kuala Kangsar Station to Kroh and Rambutan marcots from Penang to the Agricultural Field Officer, Singapore.

Produce sold included 52½ kati of oranges from the Pekan Station, 4944 oranges from the Kuala Kangsar Station, together with 252 hen eggs and 7 Rhode Island Red cocks.

Propaganda Caravan.

The Rural Lecture Caravan commenced a tour in Malacca on the 25th. May at Kesang Tua. The tour is to last until the 6th. June and centres in all parts of the Territory are to be visited. The programme of displays is the same as that followed for the tour in Batang Padang and Ulu Selangor Districts during April.

Rat Destruction.

In Krian and Province Wellesley the payment of rewards for rat tails was discontinued from the 16th. May. In Province Wellesley all outstanding accounts were settled, the total number of tails paid for during the half month was 518,448 and the total number received since the commencement of this year was 1,078,156, while 20,000 poisoned baits were distributed during the month.

In Malacca 56,818 tails were collected. Continuous rain caused flooding of the padi fields and this rendered difficult the opening up of rat nests in the bunds.

DEPARTMENTAL NOTES.

Advisory Committee of the School of Agriculture, Malaya.

The first meeting of the Advisory Committee of the School of Agriculture, Malaya, was held at the School on April 30th., 1931.

Coffee Beans for Local Sale.

Investigations have been undertaken at the Government Experimental Plantation, Serdang, towards the production of a high class sample of coffee bean for local sale. The results have been very encouraging.

Questionnaire to Copra Producers.

In connection with the work of the Assistant Chemist for Copra Investigations, the Department has recently addressed a questionnaire to all the more important copra producers in Malaya. Recipients of this questionnaire will greatly assist the important research work on copra now being conducted by this Department by making their replies as complete and accurate as possible.

Tours by Senior Staff.

The Director of Agriculture visited Fraser's Hill in connection with the new dairy and poultry farm on May 9th. and 23rd., on the latter occasion being accompanied by the Agriculturist.

He also visited Singapore on May 14th. and 15th. On this occasion he inspected work at the new pineapple experimental station at Lim Chu Kang, visited the Singapore Cold Storage Dairy Farm and one pineapple canning factory. He also conferred with the Under Secretary, the Registrar General of Statistics and the Principal Veterinary Officer.

The Agriculturist visited Cameron's Highlands on May 9th. to 13th. in connection with the work of the Experimental Station.

The Government Entomologist and the Assistant Chemist for Copra Investigations paid a visit of 4 days duration to Kuala Langat District between May 19th. and 22nd. in connection with investigations on the subject of infestation of stored copra by insects. They visited 11 estates and addressed a meeting of the Kuala Langat District Planters' Association on 20th. May.

The Acting Agricultural Chemist visited four oil palm estates during the month in connection with investigations on the efficiency of machinery and on the improvement of the products.

Mr. R. G. H. Wilshaw, Assistant Chemist, visited Fraser's Hill on 16th. and 17th. May to examine the soils on the vegetable area around the new stock farm.

On 19th. and 20th. he visited Parit Buntar, Perak, in connection with the soil survey of the Krian irrigation area.

Appointments.

Mr. J. S. Norman, C.D.A., (Harper Adams) has been appointed a Field Instructor and Superintendent, School of Agriculture, Malaya, with effect from the 2nd. April, 1931. Mr. Norman arrived on the 30th. April, 1931.

Leave.

Mr. N. C. E. Miller, Assistant Entomologist, has been granted seven months and eight days' leave on full pay with effect from the 27th. May, 1931.

Staff Change.

Raja Mohamed bin Raja Aman who was seconded to Kedah as Agricultural Officer for a period of 4 years, returned on 19th. May, 1931 to Headquarters and was appointed Malay Agricultural Field Officer on the staff of the Department of Agriculture, S.S. and F.M.S.

Statistical.

MARKET PRICES.

May, 1931.

Rubber.—Prices appreciated slightly over the very low figures to which rubber had fallen at the end of April, although the average price for May is lower than that of the previous month. Singapore average price per lb. in May was 9.1 cents, London 3d., compared with 9.7 cents and 3.3d. respectively in April.

Palm Oil.—London reports under date of 7th May, 1931: "Since our last, the market, in common with all other descriptions of oils and oilseed, has further declined and to-day's value of 7 per cent. oil is not more than £16.10.0 per ton C.I.F. according to position and quantity available, which gives a parity on an F.O.B. basis of about £12 (= £15.10.9 basis 18 per cent. f.f.a. C.I.F.)".

Copra.—Following the weakness in consuming centres, the market has shewn a severe decline, in spite of moderate supplies. The price of "Sundried" at the beginning of May was $5.35 per picul, but declined steadily throughout the month to $4/- per picul. The average price of this quality was $4.80 per picul, compared with $5.58 for April. For the "Mixed" quality, the average price was $4.59 compared with $5.33 for April.

Pineapples.—Following the heavy packing and shipping season, supplies are now short and prices shewed some advance during the latter half of the month. Average prices per case for the month were: 1½ lb. cube, $3.20; 1½ lb. sliced flat, $3.09; 1½ lb. tall, $3.37. Corresponding figures for April were $3.20, $3.05, $3.36.

Tapioca.—Prices moved but little during May, although flake tapioca advanced by 20 cents per picul. Average prices per picul were: Flake, fair, $3.32; Pearl, seed, $4.50; Pearl, medium, $5, corresponding prices for April being $3.59; $4.81; $5.50.

Coffee.—On account of small arrivals, coffee prices are firmer in Singapore. Java Robusta appreciated from $17.50 to $18.75 per picul, the average price being $18.19 compared with $17.75 per picul in April. Palambang coffee was quoted from $11.75 to $12.50 per picul, the average being $12.12 compared with $12.14 per picul in April.

Areca Nuts.—Prices continue to decline owing to the small demand from India. Average prices per picul for the various grades were, Palambang Whole $4.81; Bila Whole, $3.94; Kelantan Split $5.25 compared with $6.14; $5.37 and $6.15 in April. For other grades, the average prices ranged as follows:—Sliced, $11.75 to $12.94 according to quality; Red Whole $4.61 to $5.35; Split $3.82 to $4.97, the price within range in each case depending on quality.

Rice.—Further decline in rice prices are recorded in May. Siam No. 1 fell from $162 to $153 per coyan, Saigon No. 1 from $151 to $143, Rangoon No. 1 from $137 to $121. Average prices per coyan for the month were, Siam $157, Saigon $135, Rangoon $126 compared with $164, $153 and $135 in April.

In the padi-growing districts, the price of padi was about 4—5 cents per gantang (Imperial gallon). In the large towns it was slightly higher, while in non-padi growing districts the ruling prices were around 10 cents per gantang.

Gambier.—Featureless market. Cube No. 1 has remained at $15 per picul, while block gambier declined 50 cents to $11 per picul. Average prices for May: Cube No. 1 $15, Block $11.21 per picul compared with $15.37 and $11.31 per picul in April.

Pepper.—Supplies are small and dealers are not keen sellers. The tendency of the market has been towards lower levels. Average prices per picul in May, Singapore black, $18.44; Singapore, white, $32.20; Muntok, white, $33.68. Corresponding prices in April were $20.31; $34.56; $35.56.

Cloves. Average Singapore prices for May were:—Zanzibar, $54.40 per picul; Amboina, $56 per picul compared with $50.25 and $48.62 respectively in April.

Nutmegs.—Average prices in Singapore for the month were:—for 110 per lb. $19.50 per picul; 80 per lb. $25.70 per picul. Corresponding prices in April $20.87 and $25.87.

Mace.—Average Singapore prices for May: Siouw, $56 per picul against $64.50 in April; Amboina, $43 per picul against $47 in April.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce weekly reports for the month and on other local sources of information. Palm Oil Reports are kindly supplied by Messrs. Lewis and Peat (Singapore) Ltd., and the Singapore prices for Coffee and Arecanuts by the Lianqui Trading Company of Singapore.

1 picul = 133⅓ lbs. ... ... 1 coyan = 40 piculs.

The dollar is fixed at two shillings and four pence.

NOTE. The Department of Agriculture will be pleased to assist planters in finding a market for agricultural products. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

MALAYA RUBBER STATISTICS

TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF APRIL, 1931, IN DRY TONS.

Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres (estimated) 2		Imports				Exports (including re-exports)				Stocks at end of month		
								during the month		during the year 1931		during the month		during the year 1931				
	Ports	Dealers	Estates of 100 acres and over	During the month	during the year 1931	during the month	during the year 1931	Foreign	From Malay States	Foreign	From Malay States	Foreign	Local	Foreign	Local	Dealers	Estates of 100 acres and over	Ports
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MALAY STATES :—																		
Federated Malay States	...	14,788	13,696	9,927	45,025	5,754	35,300	Nil	Nil	Nil	26	12,143	6,575	53,890	28,670	12,864	12,583	...
Johore	...	2,252	4,417	3,251	14,014	3,519	16,129	Nil	2	Nil	7	861	5,980	2,817	27,579	2,228	4,372	...
Kedah	...	332	1,954	1,830	7,931	853	4,226	Nil	Nil	Nil	Nil	462	2,024	2,502	10,221	432	2,051	...
Perlis	...	9	6	5	28	12	51	Nil	Nil	Nil	Nil	Nil	13	Nil	81	10	9	...
Kelantan ...	...	299	108	217	778	6	1,638	Nil	Nil	9	Nil	92	328	301	2,125	108	102	...
Trengganu ...	..	55	50	86	373	43	186	Nil	Nil	Nil	Nil	Nil	129	Nil	559	55	50	.
Total Malay States		17,735	20,231	15,316	68,149	10,187	57,530	Nil	2	9	33	13,558	15,049	59,510	69,235	15,697	19,167	...
STRAITS SETTLEMENTS																		
Malacca ...	...	2,827	1,416	1,084	4,578			Nil		Nil		3,985		20,265		2,795	1,364	...
Province Wellesley	...	96	428	391	1,657	(2)	(2)	Nil		Nil						126	458	...
Dindings ...	...	172	96	69	363	1,738	8,117	Nil	15,407	Nil	69,202	6,472	Nil	24,887	Nil	171	80	...
Penang	1,907	5,716	5	5	29			676		3,117						4,986	5	1,630
Singapore ...	2,076	35,506	316	174	747			7,414		31,724		19,338				33,738	332	1,771
Total Straits Settlements	3,983	44,317	2,261	1,723	7,374	1,738	8,117	8,090	15,407	34,841	69,202	29,795	Nil	70,810	Nil	41,456	2,239	3,401
TOTAL MALAYA	3,983	62,052	22,492	17,039	75,523	11,925	65,647	8,090	15,409	34,850	69,235	43,353	15,049	175,472	69,235	57,153	21,406	3,401

TABLE II

DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Total
20	21	22	23	24	25	26
Smoked sheet	9,740	19,510	2,996	2,171	756	35,173
Crepe	599	11,446	1,475	732	209	14,461
Unsmoked sheet } Scrap and lump }	1,440 / 1,085	2,422	515	189	713 / 520	6,914
Total all Grades	12,864	33,378	4,986	3,092	2,228	56,548

TABLE III

FOREIGN EXPORTS

PORTS	For month	during the year 1931
Singapore ...	28,923	113057
Penang ...	9,187	40,609
Port Swettenham.	4,843	19,465
Malacca ...	400	2,341
MALAYA ...	43,353	175472

TABLE IV

THE PROPORTION OF FOREIGN EXPORTS REPRESENTING DOMESTIC PRODUCTION 4

AREA	For month	during the year 1931
Malay States ...	34,471	140796
Straits Settlements		
MALAYA ...	34,471	140496

Notes :—1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] − [2] − [3] [4] − [5] [9] − [10] For the Straits Settlements, the figure represents purchases by dealers from local estates of less than 100 acres during the month.

3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15%; wet sheet, 25%; scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.

4. The proportion of foreign exports representing Malayan domestic production is estimated by deducting the average monthly dry weight of foreign imports over a period of 2 months from the gross foreign exports of the later month, the foreign exports of the Malay States being domestic production.

5. The above, with the omission of certain explanatory notes, is the Report published by J. I. Miller, M. C. S., Acting Registrar-General of Statistics S.S. and F.M.S., at Singapore on May, 19, 1931.

GENERAL RICE SUMMARY.

April, 1931.

Malaya.—The net imports of rice into Malaya (i.e. consumption of foreign rice) in April was 34,743 tons.

Of the total imports of foreign rice Siam provided 42 per cent. Burma 47 per cent., French Indo-China 10 per cent. and other countries 1 per cent.

The total exports of rice from Malaya during April, 1931 were 12,445 tons of which only 40 tons were produced locally.

India.—Total foreign exports of boiled rice during January and February this year were 292,000 tons against an average during the same months of the past six years of 290,000 tons.

Siam.—Exports from Siam during the period December, 1930—March, 1931 were 411,000 tons against the five years average (for similar periods) of 505,000 tons.

Tables of interest are given below :—

The retail prices of No. 2 Siam Rice in cents per gantang in the Municipal Markets of the Colony were :—

	Singapore.	*Penang.*	*Malacca.*
1929 Average Jan.—Dec. ...	52	57	52
1930 „ „ „ ...	50	52	50
1931 January	37	44	38
February	35	40	35
March	35	38	36
April	33	38	35

Average wholesale Siam rice prices per ton in Singapore, were in dollars (Straits) :—

	1930	1931				Increase (+) or Decrease (—) per cent. on previous month
	Average Jan. — Dec.	Jan.	Feb.	Mar.	Apr.	
Singapore No. 1 ...	130	94	89	80	77	—3.8
Singapore No. 2 (Special) ...	118	85	80	70	68	—2.9
Singapore No. 2 (Ordinary) ...	108	76	73	65	63	—3.1
Siam White Broken A. 1 ...	86	58	51	48	48	.....
Siam White Broken C. 1 ...	81	55	48	45	45	.....

Net Imports of Rice into Malaya

(Consumption of Foreign Rice) April, 1930

(in tons)

Into	Tons	Per cent.	Per cent. 1930
Singapore ...	11,869	34	42
Penang ...	6,633	19	20
Malacca ...	2,262	7	4
F.M.S. ...	12,959	37	32
U.M.S. ...	1,020	3	2
Total ...	34,743	100	100

Europe.—According to the London Rice Brokers' Association Weekly Circular dated April 9, 1931, the quantities of rice shipped from the East during the following periods were (in 000 tons) :—

To Europe, period January 1 to April 9.

From	1930	1931	Decrease (—) in Increase (+) or Percentage 1931
Burma	117	100	— 14.5
Saigon	44	41	— 6.8
Siam	12	17	— 41.7
Elsewhere	8	18	—125.0
	181	176	— 2.8

METEOROLOGICAL SUMMARY, MALAYA. APRIL, 1931.

Locality	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of		Mean of A and B	Absolute Extremes				At 1 foot	At 4 feet	Total		Most in a day	Number of days					Total	Daily Mean	Per cent
	A. Max.	B. Min.		Highest Max.	Lowest Min.	Lowest Max.	Highest Min.						Precipitation* .01 in or more.	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	Amt. in.						hr.	hr.	%
Railway Hill, Kuala Lumpur, Selangor ...	92.4	74.1	83.3	95	70	81	76	85.6	85.6	8.01	203.5	1.28	21	17		2		174.15	5.18	42
Bukit Jeram, Selangor ...	90.0	74.4	82.2	92	70	85	76	86.0	88.2	7.65	194.3	1.84	19	15	4	1		195.55	6.52	53
Sitiawan, Perak ...	90.9	74.4	82.7	94	71	85	77	85.6	85.4	8.89	225.8	2.15	19	14	5	1		204.05	6.80	
Kroh, Perak ...	89.9	71.9	80.7	93	68	84	75	83.8	84.2	14.30	363.2	1.65	23	22	4			198.85	6.63	
Temerloh, Pahang ...	92.6	73.9	83.3	95	72	79	76	87.2	87.3	5.53	140.5	2.27	16	11	2	10	1	193.10	6.44	57
Kuala Lipis, Pahang ...	91.9	72.6	82.3	95	70	79	75	84.9	85.2	4.81	122.2	1.06	17	14	18	15	2	206.20	6.87	56
Kuala Pahang, Pahang ...	87.8	75.4	81.6	90	72	81	79	85.2	86.3	8.16	207.3	2.00	17	14	4	1		233.15	7.77	64
Mount Faber, Singapore ...	89.0	75.7	82.3	94	72	80	79	82.6	83.3	6.80	172.7	2.56	19	11	2			179.50	5.98	49
Butterworth, Province Wellesley ...	90.2	75.6	82.9	94	72	88	79	87.0	86.2	4.50	114.3	1.35	21	12	2		1	229.70	7.66	
Bukit China, Malacca ...	86.7	74.4	80.5	91	72	82	76	84.0	85.6	5.53	140.5	0.80	21	16	7			208.30	6.94	57
Kluang, Johore ...	90.4	72.6	81.5	95	70	79	75	83.0	83.5	10.28	261.1	3.04	22	19	9	14		163.05	5.43	45
Bukit Lalang, Mersing, Johore	88.5	73.0	80.7	93	70	76	75	83.5	82.6	6.09	134.7	2.68	16	9				206.55	6.88	56
Alor Star, Kedah ...	91.3	74.7	83.0	96	72	85	77	87.7	87.2	5.86	148.9	1.03	17	15	2	3		234.35	7.81	64
Kota Bahru, Kelantan ...	92.3	74.7	83.5	96	72	84	77	85.9	85.0	0.81	20.6	0.28	6	5				249.20	8.31	68
Kuala Trengganu, Trengganu	90.1	74.1	82.1	93	72	81	76	86.1	86.5	2.49	63.3	0.82	8	6		10		244.15	8.14	67
HILL STATIONS.																				
Cameron's Highlands, Rhodendron Hill, Pahang 5120 ft. ...	74.1	60.5	67.3	77	51	67	68			7.99	203.0	1.75	24	23		4		165.45	5.52	45
Cameron's Highlands, Tanah Rata, Pahang 4750 ft. ...	74.4	57.9	66.1	78	53	69	62	71.3	69.7	7.78	197.6	1.21	24	22		14		149.90	5.00	41
Fraser's Hill, Pahang 4268 ft.	75.2	63.6	69.4	78	59	67	65	73.5	73.7	13.35	339.2	2.34	25	21	3	20	1	145.50	4.85	40

*Precipitation .01 inch or more when measurement is in inches .2mm. or more when measurement is in millimetres.

Compiled from Returns supplied by the Meteorological Branch, Malaya.